HORTICULTURAL ABSTRACTS

Vol. XXVII December 1957 No. 4

INDEX OF CONTENTS.

Initialled abstracts and reviews not by Bureau staff are by E. M. Ford and R. V. Harris of the East Malling Research Station, and by J. R. Llewelyn.

Nos.

MISCELLANEOUS Abstr. 64. Noted 48 3025-3090v
- General .. 3025-3026
- Statistical design and methods .. 3027-3030
- Climatic factors and air pollution .. 3031-3035
- Radiation effects .. 3036-3038
- Physiology .. 3039-3043
- Growth substances .. 3044-3059
- Biochemistry .. 3060-3069
- Nutrition .. 3070-3078
- Soil and water .. 3079-3082
- Machinery and apparatus .. 3083-3085
- Marketing .. 3086-3088
- Noted .. 3089a-3090v

TREE FRUITS, DECIDUOUS Abstr. 98 Noted 38 3091-3190l
- General .. 3091-3099
- Breeding and varieties .. 3100-3107
- Propagation and rootstocks .. 3108-3124
- Growth phenomena .. 3125-3131
- Pollination .. 3132
- Nutrition, soil management and irrigation .. 3133-3149
- Pruning .. 3150-3153
- Spraying for cultural purposes .. 3154-3163
- Composition of plants .. 3164-3165
- Composition and physiology of fruits 3166-3171
- Harvesting, packing and marketing .. 3172-3176
- Storage .. 3177-3188
- Noted .. 3189a-3190l

SMALL FRUITS, VINES AND NUTS Abstr. 49. Noted 24 3191-3240x
- Small fruits .. 3191-3212
- Vines .. 3213-3235
- Nuts .. 3236-3239
- Noted .. 3240a-3240x

PLANT PROTECTION OF DECIDUOUS FRUITS Abstr. 96 Noted 35 3241-3338i
- General .. 3241
- Disturbances of nutrition or of unknown origin .. 3242-3249
- Climatic factors .. 3250-3261
- Viruses .. 3262-3267
- Bacteria .. 3268-3270
- Fungi .. 3271-3295
- Nematodes .. —
- Mites .. 3296-3299
- Insect pests .. 3300-3323
- Other pests .. 3324-3325
- Sprays and spraying .. 3326-3336
- Noted .. 3337a-3338i

Nos.

WEEDS AND WEED CONTROL Abstr. 68 Noted 19 3339-3407s
- Herbicides and their application .. 3339-3345
- Control of aquatic weeds .. 3346-3348
- Control of particular species .. 3349-3351
- Weed control in the orchard and vineyard .. 3352-3354
- Weed control in ornamentals .. 3355-3363
- Weed control in tropical crops .. 3364-3370
- Weed control in turf .. 3371-3375
- Weed control in vegetables, herbs and other crops .. 3376-3406
- Noted .. 3407a-3407s

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE Abstr. 196 Noted 42 3408-3605p
- General .. 3408-3427
- Artichokes .. 3428-3430
- Asparagus .. 3431
- Brassicas .. 3432-3451
- Celery .. 3452-3457
- Cucurbits .. 3458-3472
- Legumes .. 3473-3503
- Mushrooms .. 3504-3508
- Onions and allied crops .. 3509-3521
- Root crops .. 3522-3534
- Salad crops .. 3535-3547
- Spinach .. 3548-3551
- Tomatoes and capsicums .. 3552-3603
- Noted .. 3604a-3605p

TOBACCO Abstr. 58 Noted 24 3606-3664x
- Breeding and varieties .. 3606-3608
- Seed treatment and germination .. 3609-3613
- Environment and nutrition .. 3614-3620
- Cultural practices .. 3621-3627
- Physiology and biochemistry .. 3628-3643
- Diseases and pests .. 3644-3658
- Curing and quality tests .. 3659-3663
- Noted .. 3664a-3664x

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS Abstr. 47 Noted 25 3665-3712y
- Condiment and spice plants .. 3665-3672
- Drug plants .. 3673-3677
- Essential oils .. 3678-3680
- Fibres .. 3681-3690
- Hops .. 3691-3697
- Insecticidal plants .. 3698
- Rubber plants .. 3699-3703
- Seed oils .. 3704-3707
- Sundry plants .. 3708-3711
- Noted .. 3712a-3712y

INDEX OF CONTENTS—*continued*

Nos.

FLORICULTURE Abstr. 102 Noted 46 3713-3816t
- General 3713-3726
- Annual and herbaceous plants .. 3727-3750
- Bulbs, tubers, etc. 3751-3764
- Lawns and sports turf 3765-3773
- Succulents 3774
- Roses 3775-3787
- Other trees and shrubs 3788-3814
- Noted 3815a-3816t

SUB-TROPICAL FRUIT AND PLANTATION CROPS Abstr. 75 Noted 37 3817-3893k
- General .. .. —
- Avocadoes 3817-3822
- Citrus—general .. .. —
- Citrus—propagation and rootstocks .. 3823-3829
- Citrus—climatic factors 3830-3831
- Citrus—tree composition and nutrition 3832-3844
- Citrus—growth phenomena 3845-3848
- Citrus—diseases and pests 3849-3868
- Citrus—fruit composition, storage and products 3869-3875
- Dates 3876
- Olives 3877-3888
- Passion fruit 3889-3890
- Tung 3891
- Noted 3892a-3893k

Nos.

TROPICAL FRUIT AND PLANTATION CROPS Abstr. 102 Noted 47 3894-3997u
- General 3894-3897
- Bananas 3898-3901
- Cacao 3902-3922
- Coconuts 3923-3924
- Coffee 3925-3948
- Mangoes 3949
- Oil palms 3950-3952
- Rubber trees 3953-3957
- Sugar cane 3958-3979
- Tea 3980-3989
- Sundry crops 3990-3995
- Noted 3996a-3997u

NOTES ON BOOKS AND REPORTS Abstr. 31 Noted 23 3998-4029w
- Books 3998-4012
- Annuals and reports 4013-4026
- New periodicals 4027-4028
- Noted 4029a-4029w

Total abstracts 986. Noted 408.

N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

SALIENT ITEMS, Vol. 27, No. 4

ENVIRONMENT

Light:—Light intensity, duration and type affect pigment formation and therefore colour in leaves and fruits (3066, 3169, 3170, 3206). The effects of red or ordinary light on growth may be checked or reversed by short periods of exposure to far-red radiation (3036, 3733). Among plant characteristics influenced by day length are diurnal leaf movements, succulence and branching (3477, 3774, 3804).

Light-temperature interactions:—Effects on flower initiation are described for strawberries (3205), peas (3476), chrysanthemums (3734–3736) and poinsettias (3805), and effects on essential-oil formation for peppermint (3679).

Temperature:—We regret to have to report another point on which America and Russia seem to disagree, namely the best time to apply cold treatment to tomatoes to increase early flower production (3562, 3566). The effects are described of shoot temperature on root growth in maples (3042) and of root temperature on nutrition and growth in strawberries (3209). More complex is the hypothesis that midday closure of stomata in coffee and onions is a temperature effect operating through the accumulation of CO_2 in the leaves (3039, 3040).

Water:—There is further information on relationships between rainfall and yield in citrus and coffee (3830, 3931), between rainfall and nutrient uptake in tomatoes and oil palms (3579, 3951, 3952), and between rainfall needs and plant age in beans (3491). Competition for water by intercrops in cherry orchards (3146) and water transfer from plant to plant through intertwined tomato root systems (3043) are also described. To irrigate coffee effectively a basin system requires much less water than a sprinkler system (3933).

GROWTH PHENOMENA

Dormancy:—Three papers describe studies on the rest period of deciduous fruit trees (3128–3130) and a fourth suggests a connection between nucleic acid content and depth of dormancy in the evergreen tea plant (3984).

Tree growth:—Checked by tying knots in the stems of apple trees (3127).

Sphaeroblasts:—On olives and their anatomy (3878).

Fruit growth:—Avocado fruits are larger in the morning than in the evening (3820).

Abscission:—Flower drop in ornamentals is associated with chemical changes in the stalk (3718). In grapes maximum berry drop coincides with minimum auxin content (3222). It is suggested that auxin maintains the turgor of cells in the abscission zone by preventing movement of cellular substances into the intercellular spaces (3044).

Plant extracts:—These include a flower-delaying substance from pea plants (3480) and phenols and cyanide with inhibiting properties from bean seeds and peach trees (3069, 3165).

Gibberellins:—It would only seem necessary to say that they now seem to be everywhere, doing everything, except apparently stimulating root growth (3050–3059, 3568, 3569, 3717).

Other growth substances:—There is more evidence that growth substances applied to developing stone fruits may inhibit germination of the seeds formed in them (3162). Two phthalamic acids applied to tomato leaves may induce the formation of more flowers (3567). Maleic hydrazide is being tested as a substitute for pinching on both carnations and chrysanthemums (3729, 3737) and as a means of maintaining high sugar contents in sugar cane harvested late in the season (3974). The growth responses of sugar cane to sulpha drugs are also being investigated (3973).

MACHINERY AND EQUIPMENT

Machines:—General items include accounts of ramie production machinery (3683) and of the use of winches in horticulture (3083). Among particular items are a precision seed drill (3084), a portable machine for cutting vine grafts (3219) and a castor bean combine harvester (3704).

Apparatus:—Another new controlled-environment growth cabinet is described (3085).

Plastic materials:—For storing or packaging apples and pears (3173, 3182–3186), cranberries (3197), vegetables (3427) and plants (3730), and for use in black or white forms as mulches (3079, 3465, 3539, 3572).

NUTRITION

Mineral deficiency symptoms:—These are described, in some cases with the aid of brightly-coloured, even lurid, photographs, for garlic (3519), tomatoes (3576), oil palms (3950), hevea rubber (3955) and acerola trees (3990).

Absorption and plant composition:—Interesting comparisons are reported between the absorption of elements by roots and by aerial parts of apple trees and vegetables (3133, 3489), and further evidence is presented that nutrients can enter fruit trees through the bark (3138). The uptake of P is correlated with photosynthetic factors (3073) and that of K with pH (3078). Urea absorbed by the leaves of bananas travels a long way before it is hydrolyzed (3899). Other papers explore the cation exchange capacity of the roots of different ornamental species (3716), the absorption of anions and cations by, and the optimum anion:cation ratios in, tobacco and coffee plants (3616, 3938), and the effects of salinity on citrus (3840) and ornamentals (3757, 3808, 3812, 3813).

Nitrogen:—In tobacco N deficiency can upset the changes in pigments which normally occur in ageing leaves (3642). In citrus excess of N reduces the number of feeder roots (3837), and in ericas it increases the top:root ratio and prevents the development of mycorrhizal fungi which protect the roots against invasion by parasitic fungi (3796). Comparison between ammonia and nitrate forms of N are described for azaleas (3811) and citrus (3835, 3836). There is some evidence that the ability of coffee plants to utilize nitrates and nitrites declines with age (3936).

Boron:—More information is available on the stimulating effect of B on pollen-tube growth (3077, 3910, 3992), and it has also been shown to enhance the growth of adventitious roots (3076, 3742) and to affect cell wall formation (3453). Under some conditions the beneficial effects of lime, Mg and B on carrot yields can apparently be transmitted through six generations of seed (3525).

Iron:—How to determine Fe in plants (3060), and the effect of Fe on the sensitivity of tomato plants to lycomarasmin (3577); otherwise it is chelates and more chelates for apples and pears (3242–3244), peas (3490), citrus (3841–3844) and ornamentals (3792).

Other elements:—These include S metabolism in peas (3065), the absorption of Co by cabbages and other plants (3063, 3064), Ni to improve the size of grapes (3231), Zn to improve growth in tung trees (3891) and fruit set in cacao (3911), and a whole range of radioactive exotics (3062, 3417).

PLANT PROTECTION

Fungi and bacteria:—In bean fields disease incidence and yield may be closely related to the amount of damage done to the plants during cultivation (3495). In tomatoes X-rays and growth substances may alter resistance to *Fusarium* wilt (3592). Among fungicides the antibiotic griseofulvin shows promise against several troublesome diseases (3720, 3770), sulphur and copper show synergism when applied in dust mixtures against black spot of roses (3780), and undiluted lime-sulphur can be applied by a paint spray gun to control scab and mildew of apples (3275).

Viruses:—The problem of determining differences in varietal susceptibility does not become any simpler (3644, 3977). Nor, for that matter, do problems associated with the interaction of different viruses or different strains of a virus (3645, 3852) or with the physiological consequences of infection (3586, 3646, 3647). Among chemicals which have shown some success as virus inhibitors are trichothecin (3649), several chlorophenoxyacetic acid derivatives (3420) and an antibiotic from a *Streptomyces* known as Cytovirin (3492).

Mites and insects:—What spider mites do to apple leaves (3296) may be suitably countered by what apple leaves do to spider mites (3298). There is an observation, still of uncertain significance, on a decline in mite populations following applications of the fungicide zineb (3861). There are also two new reports of caterpillars being completely destroyed by sprays of bacteria (3314, 3449).

Plant and animal responses to chemicals:—Three papers leave little doubt that the newer organic insecticides and fungicides can affect the metabolism of many plants (3423, 3502, 3530). A fourth paper takes the same story a stage further and describes the rather horrid effects of the metabolites formed in crops on the animals that eat them (3047).

PROPAGATION

Seeds:—As much as 3 to 4 months before citrus fruits mature embryos can be obtained from them which are able to produce roots and shoots (3847). With excised peach embryos exposure of part of the cotyledons to continuous light can result in rapid growth (3109). Among chemicals used to stimulate germination are organic compounds (3537, 3538), ethyl ether (3690), sodium hypochlorite (3201) and uranium nitrate (3609). Beneficial effects are also reported from treatments with ultraviolet light (3701) and heat (3462, 3612).

Cuttings:—Both juvenile and mature tissues of ivy contain substances which inhibit root development, but juvenile cuttings also contain a rooting co-factor which is absent in mature cuttings (3797). Sprouts produced by severed citrus roots are physiologically young and provide leaf-bud cuttings that root readily (3823). Other papers include a review of methods used in cacao propagation (3904), notes on the response of deciduous tree fruits and walnuts to quick-dip IBA treatment and mist (3112, 3238), and an account of a trial in which different wounding techniques were compared for rhododendrons (3810).

Unusual grafts:—With half embryos of tobacco (3637), flower cushions of cacao (3912) and immature lemon fruits (3869).

Rootstock-scion relations:—Stock-scion relations in pome and stone fruits are reviewed (3113). In pears the use of double-shield budding to overcome incompatibility between pear and quince may occasionally fail through the formation of a temporary direct union between stock and scion (3120). The cropping capacity of glasshouse melons can be enhanced by grafting them on other cucurbits (3464) and the frost resistance of dahlias by grafting them on chrysanthemums (3756).

STATISTICS

Design and analysis:—Some solid stuff in the general section on statistics (3027–3030) may be supplemented by reference to papers on plot size in trials with trees and bushes (3092), on the lay-out of field experiments with vegetables (3408) and coffee (3925, 3932) and on the design of storage trials with onions (3516). In tobacco experiments plant-to-plant variation can be reduced by adopting suitable transplanting techniques (3623), and greater precision can also be obtained in trials with large pecan trees varying in size by the use of multiple covariance analysis (3237). Results obtained in citrus and avocado trials emphasize that some of the factors commonly measured are much more variable than others and that account should be taken of these differences in variability in the planning of experiments (3832).

Sampling fruits:—Papers directly or indirectly concerned with sampling problems include one on small fruits (3191), two on tomatoes (3554, 3556) and one on avocado pears (3821).

Leaf area measurement:—A method is described whereby the leaf areas of apples, pears and cherries can be determined by simple measurements made on the plants (3125).

MISCELLANEOUS

Historical:—The story of horticulture on the Canadian Prairies (4011).

Parthenocarpy:—Induced by dead pollen and pollen extracts (3225).

Pot cleaning:—Changes in root distribution following removal of algae from pots with copper naphthenate (3719).

Reassurance:—No reports have yet been received which suggest that crops respond to the light of artificial moons.

MISCELLANEOUS.

General.

(*See also* 3089k, o, 3090i, v, 3417, 4011, 4016, 4018, 4023, 4024, 4029a-f, j, l, n, r, u, v, w.)

3025. LeCrone, F.
The introductory course in horticulture.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 601-4, bibl. 3.

From a questionnaire circulated in 1955 to the horticultural departments of Land Grant Colleges in the United States it was found that there was a decrease of about 10% in the number of students enrolled over the past 3 years, a shift of interest among the students from fruit and vegetable crops to ornamentals, and a shift of emphasis in tuition from crops and practices to fundamentals.—A. and M. Coll., Stillwater, Okla.

3026. Koverga, A. S., and Ryndin, N. V.
Some results of work at the Nikitskij state botanic garden. [Russian.]
Agrobiologija, 1957, No. 1, pp. 112-18, illus.

A description is given of the more important results obtained in recent years with temperate and subtropical fruits, ornamentals and technological plants [see also *H.A.*, 21: 4].

Statistical design and methods.

(*See also* 3090c, 3092, 3191, 3237, 3408, 3554, 3832.)

3027. Steel, R. G. D.
An analysis of perennial crop data.
Biometrics, 1955, **11**: 201-12, bibl. 6.

A bivariate analysis of variance is applied to perennial crop data. A test of an hypothesis about varietal effects is made. The bivariate analysis and a univariate analysis are compared. Two transformations of the data are considered. An expedient for locating varietal differences is proposed. [Author's summary.]

3028. Finney, D. J.
Multivariate analysis and agricultural experiments.
Biometrics, 1956, **12**: 67-71, bibl. 3.

The author is highly critical of the use of multivariate analysis of variance and the construction of canonical variates in the analysis and interpretation of agricultural and other experiments. In particular he attacks the arguments used by Steel [see preceding abstract].

3029. David, F. N., and Moore, P. G.
A bivariate test for the clumping of supposedly random individuals.
Ann. Bot. Lond., 1957, **21**: 315-20, bibl. 3.

A method is proposed for the analysis of plant distributions from the relative positions of individual plants rather than from the numbers of plants occurring in successive small areas. The method is illustrated by reference to the detailed distribution in nature of *Solidago rigida* and of plants infected with nettlehead, a virus disease of hops. [Authors' abstract.]—Univ. Coll., London.

3030. Pearce, S. C.
Experimenting with organisms as blocks.
Biometrika, 1957, **44**: 141-9, bibl. 1.

The statistical implications of using organisms as blocks are considered, special attention being given to the case of a treatment applied to one plot having a local effect on the plot to which it is applied and remote effects elsewhere in the block, and also to the case of remote and local effects interacting. A worked example is given [based on a trial to determine the xenia effects of different pollens on the size of apple fruits], and the usefulness of the method is discussed. [Author's summary.]—E. Malling Res. Stat.

Climatic factors and air pollution.

(*See also* 3090n, 4006.)

3031. Godson, W. L.
Report on evaluation of cloud-seeding operations in Manitoba and Saskatchewan 1953-54.
[*Mimeo.*] *Circ. meteor. Div., Dep. Transport, Canada* **2649** (TEC 215), 1955, pp. 41, bibl. 12.

Cloud-seeding operations (Ag I ground generators), which resulted in decreased precipitation in the seeded area, are discussed.

032. Hart, S. A., and Zink, F. W.
Brushing and brushing materials for frost protection.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 475-9, bibl. 5, illus.

"Brushing" consists of placing shields of brown kraft wrapping paper attached to a framework of lath or wire with supports on the north side of east-west rows leaning over the plants to be protected. This helps to keep the plant environment warmer. Although the use of aluminium foil shields adds to the heat of the soil in the day time, it is not advantageous at night and tomato seedlings so protected did not benefit. It is essential that the plants should be well covered by the brush.—Univ. Calif., Davis.

3033. Benedict, H. M., and Nielsen, J. P.
The markings produced by various air pollutants on leaves.
Comb. Proc. nat. Shade Tree Conf., 1956, pp. 205-14.

Notes are given on injury by ammonia, chlorine, hydrogen sulphide, nitrogen oxides, chlorine and sulphur dioxides, hydrogen fluoride and smog [see also *H.A.*, 27: 7].

3034. McNulty, I. B., and Newman, D. W.
Effects of atmospheric fluoride on the respiration rate of bush bean and gladiolus leaves.
Plant Physiol., 1957, **32**: 121-4, bibl. 17.

Bush bean and gladioli were exposed to known concentrations of atmospheric fluoride and the respiration rate of their leaves was measured manometrically. The fumigation resulted in an increase in leaf respiration of bush bean plants after a minimum of 8 days at 30 p.p.b. [U.S.A. billion=10^9] atmospheric fluoride concentration. Middle age and old leaves showed a greater increase in respiration than did young leaves. Gladiolus leaves fumigated at 2·4 p.p.b. for 25 days showed a high degree of stimulation of respiration of the chlorotic tissue next to the scorched area, and a lower but significant stimulation of respiration of tissue 5 cm. from the dead area. Liming the leaves of gladiolus plants did not affect their respiration rate, and did not protect them against fluoride damage. [Authors' summary.]—Univ. Utah, Salt Lake City. [See also *H.A.*, 27: 1241.]

3035. Newman, D. W., and McNulty, I. B.
The effect of fluoride fumigation on the chlorophyll content of leaves.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): vii.

The chlorophyll content of bush bean leaves was reduced 22% and 46% when they were fumigated for 12 and 18 days respectively with 30 p.p.b. [U.S.] F. The chlorophyll reduction was much greater in younger leaves than in older leaves, suggesting an inhibition of chlorophyll synthesis. Tissue adjacent to F-scorched margins of gladiolus leaves had 66% less chlorophyll than tissue 5 cm. back from the scorch.—Univ. Utah, Salt Lake City.

Radiation effects.

(*See also* 3635, 3728, 3734, 4029g, i.)

3036. Klein, W. H., and others.
Time course of far-red inactivation of photomorphogenesis.
Science, 1957, **125**: 1146-7, bibl. 8.

It has been found that red radiant energy stimulates development of seedlings and that this stimulation can be inactivated by far-red radiant energy. The hypothesis has been advanced that the system involves a photoreversible pigment with 2 stable electronic energy states. The investigations here reported were made to determine the time course for photoinactivation of red-induced photomorphogenesis in bean seedlings, the bioassay being the rate of opening of the hypocotyl hook. It was found that the capacity for photoinactivation by the far-red increases rapidly with time, reaching a maximum at between 1 and 2 hours and then decreasing gradually. The decrease is consistent with the hypothesis that irreversible growth reactions have occurred. For the shortest periods of time, the percentage inactivation was approximately proportional to the far-red energy. The results suggest that a thermochemical step intervenes between the absorption of red photons and maximum capacity for inactivation by the far-red. The nature of this intervening step is being investigated.—Smithsonian Instn, Wash., D.C.

3037. BOWEN, H. J. M.
Atomic radiation and horticulture.
Gdnrs' Chron., 1957, **142**: 83, 96, illus.

Among potential uses of atomic waste are the production of mutations in seed [cf. Pirovano's work on fruit species], the prolongation of dormancy in crops such as onions and carrots, the destruction of weeds, and the breaking down of plant waste. All such applications need considerable investigation before they can be safely used.

3038. NEARY, G. J.
Dependence on oxygen and temperature of the sensitivity of broad bean roots to γ-radiation.
Nature, 1957, **180**: 248-9, bibl. 6.

Under conditions of air saturation radiosensitivity of bean roots at 1–2° C. was 1·16 times that at 19–20° C. Under anaerobic conditions the ratio was 1·22. Latent injury to seedlings caused by radiation in aerobic and anaerobic conditions was not affected by oxygen after irradiation.—Atom. Energy Res. Estab., Harwell.

Physiology.

(*See also* 3089i, j, t, 3090f, j-l, p, r, 3148, 3466, 3477, 3478.)

3039. HEATH, O. V. S., AND ORCHARD, B.
Temperature effects on the minimum intercellular space carbon dioxide concentration "Γ".
Nature, 1957, **180**: 180-1, bibl. 21.

With onion and *Coffea arabica*, both plants exhibiting midday closure of stomata, a sudden increase was observed in Γ (the estimated minimum intercellular space CO_2 concentration) at temperatures between 30° and 35° C. With *Pelargonium zonale*, which does not exhibit midday closure, this sudden increase in Γ was not apparent. The hypothesis is put forward that midday closure is a temperature effect operating through the intercellular space CO_2 content.—Imp. Coll. Sci. Technol., London.

3040. HEATH, O. V. S., AND MEIDNER, H.
Effects of carbon dioxide and temperature on stomata of *Allium cepa* L.
Nature, 1957, **180**: 181-2, bibl. 5.

Further support for the hypothesis presented in the preceding abstract was obtained in experiments with onion leaves. It was established: (a) that onion stomata respond to increased CO_2 concentration by closure, as do those of other species; (b) that the high-temperature closure of onion stomata with the leaf cavity closed can be accounted for by accumulation of CO_2 in the leaf; and (c) that if accumulation of intercellular space CO_2 is prevented, high temperature causes opening.—Imp. Coll. Sci. Technol., London.

3041. BURNSIDE, C. A., AND BÖHNING, R. H.
The effect of prolonged shading on the light saturation curves of apparent photosynthesis in sun plants.
Plant Physiol., 1957, **32**: 61-3, bibl. 7.

The rate of apparent photosynthesis in relation to light intensity has been measured in leaves of 7 species, including Marglobe tomatoes, Black Valentine beans, castor beans and white Burley tobacco. The light saturation curves of the leaves of "sun" plants grown in deep shade closely resembled those of species classified as "shade". [See also *H.A.*, 27: 1027.]—Ohio St. Univ., Columbus.

3042. RICHARDSON, S. D.
Studies of root growth in *Acer saccharinum* L. III. The influence of seedling age on the short-term relation between photosynthesis and root growth. IV. The effect of differential shoot and root temperature on root growth.
Reprinted from *Proc. kon. ned. Akad. Wetensch., Ser. C.*, 1956, **59**: 416-27, bibl. 3; and 428-38, bibl. 14.

Part III. Experiments with silver maple seedlings showed that there is not always a direct relationship between root growth and contemporaneous photosynthesis [see *H.A.*, 25: 2332]. A reduction in light intensity from 5,000 to 200 lux had no immediate effect on rate of root growth immediately after germination at the end of the first growing season or during the second year. Both duration and rate of root growth appeared to be determined primarily by the amount of reserve carbohydrates in the seedlings. *Part IV.* First-year seedlings of silver maple were grown under constant conditions of light, root temperature and shoot day temperature (both 20° C.). Changes in night temperature of the shoot system induced changes in root elongation rate within 15 hours of the beginning of the dark period. At shoot night temperatures above 10° C. root elongation rate was inversely related to temperature. These results can be explained by assuming that the apparent Q_{10} for translocation of photosynthates is less than unity. This assumption is supported by the fact that when the shoot temperature remained constant at 20° C. root growth was inhibited by root temperatures above 20° C. There was no conclusive evidence that the trial Q_{10} for translocation is less than unity.—Lab. Plant physiol. Res., Wageningen. [See also *H.A.*, 26: 4015.]

3043. BORMANN, F. H.
Moisture transfer between plants through intertwined root systems.
Plant Physiol., 1957, **32**: 48-55, bibl. 15, illus.

Moisture was transferred between associated roots of

Marglobe tomato plants grown in pots of loam or sand. It was also transferred through the roots of an intervening tomato plant which itself had access only to transferred water. Moisture moved in quantities sufficient to delay, or even prevent, wilting in relatively large plants. The mechanism of transfer is discussed and it is suggested that it occurs only after some critical moisture tension has been achieved.—Dartmouth Coll., Hanover, N.H. [See also *H.A.*, 27: 42.]

Growth substances.

(*See also* 3089a, r, 3090e, m, 3108, 3154-3163, 3165, 3337g, 3339-3345, 3350-3355, 3357-3377, 3379-3407s, 3479, 3480, 3483, 3512-3515, 3537, 3551, 3565, 3567-3571, 3592, 3605g, 3609, 3610, 3647, 3699, 3717, 3729, 3737, 3797, 3848, 3880, 3905, 3974.)

3044. SACHER, J. A.
Relationship between auxin and membrane-integrity in tissue senescence and abscission.
Science, 1957, **125**: 1199-1200, bibl. 4, illus.

When bean segments were placed in petri dishes and kept moist with solutions of auxin (IAA and NAA) at 4 p.p.m., the segments were rigid after 2½–3 days and the intercellular spaces were filled with air, while the controls treated with water only were flaccid and the intercellular spaces were filled with liquid. It is concluded that auxin maintained the permeability of the membrane, preventing exosmosis of cellular substances into the spaces. Liquid-logging of the spaces was followed by dissociation of cells. With concentrations of 4, 25 and 50 p.p.m. auxin, membrane integrity was maintained for 7, 11 and 17 days respectively. There was a differential response of the tissues of the bean segments to loss of membrane integrity. It is suggested that the cells of the abscission zone may be especially sensitive to a drop in auxin level, and that below a critical level loss of membrane integrity occurs which permits displacement of cellular fluids and results in cell dissociation and abscission. This hypothesis was supported by experiments with coleus petioles.—Los Angeles St. Coll., and Calif. Inst. Technol., Pasadena.

3045. DEZEEUW, D., AND LEOPOLD, A. C.
The prevention of auxin responses by ultraviolet light.
Amer. J. Bot., 1957, **44**: 225-8, bibl. 10, illus.

Exposure of tomato plants to 4–24 hr. of ultraviolet light (2537 Å.) prevented the epinastic responses which normally follow auxin application. Exposure of etiolated pea stem sections to ultraviolet light prior to auxin treatment similarly inhibited the normal growth response. It is tentatively considered that these results are due not to the prevention of auxin uptake but rather to a prevention of auxin action inside the plants.—Purdue Univ., Lafayette, Ind.

046. WAIN, R. L., AND WIGHTMAN, F.
Studies on plant growth-regulating substances. XI. Auxin antagonism in relation to a theory on mode of action of aryl- and aryloxy-alkanecarboxylic acids.
Ann. appl. Biol., 1957, **45**: 140-57, bibl. 34, illus.

A study has been made of the antagonistic effects of a range of phenoxy and other acids on the growth-promoting activity of a number of auxins as assessed by the *Avena* cylinder and pea curvature tests. The compounds examined as inhibitors were selected on a logical basis, these molecules not possessing the structural requirements considered necessary for growth-regulating activity, yet possessing groupings which might allow them to accumulate at a site of action from which the growth response by auxins might be initiated. Our previous demonstrations that inactive stereoisomers of α-aryloxy propionic acids can competitively inhibit the activity of their active enantiomorph has been confirmed and a similar antagonism has been found to operate with other inactive aryloxy acids. Such competitive antagonism is discussed in relation to a 'three-point' contact theory on mode of action. [Authors' summary.]—Wye Coll., Kent. [For part X, see *H.A.*, 27: 1044.]

3047. SCHUPHAN, W., SCHLOTTMANN, H., AND WEINMANN, W.
Massnahmen zur Prüfung der Wirkung phytoprotektiver und wachstumsregelnder Mittel auf Pflanzenqualität, insbesondere auf biochemische Wertmerkmale. **(Tests of the action of plant protective and growth regulating chemicals on plant quality with special reference to biochemical characters.)**
Dtsch. LebensmittRdsch., 1957, Heft 4, pp. 73-80, bibl. 152.

In experiments described here the effects were noted of particular named insecticides and a growth substance known as Tomafix—believed to contain 2,4-dichlorophenoxyacetic acid and β-naphthylacetic acid, applied to cabbage and tomato respectively, on the organs, weight and breeding capacity of rats fed on the treated crops. It was found that the solubility in lipoids of the insecticides used, namely nicotine, DiDiTan, Gamma-Nexen, E605, Miltranex and Basudin, favours penetration into the waxy cuticle and into the inner layers of the cell system of the plant. This property allows also an interaction of penetrating substances with the chemical constituents of the plants. This is true before harvest, during storage and during processing. The experiments on rats showed marked differences in weights and certain organs. It is proposed that a series of determinations should be made to check the influence of insecticides and phytohormones on the nutritive value of food plants.—Bundesanst. Qualitätsforsch. Geisenheim.

3048. AUDUS, L. J., AND BROWNBRIDGE, M. E.
Studies on the geotropism of roots. II. The effects of the auxin antagonist α-(1-naphthylmethylsulphide) propionic acid (NMSP) and its interactions with applied auxins.
J. exp. Bot., 1957, **8**: 235-49 bibl. 9.

NMSP action [on the roots of pea seedlings] differs from that of the auxins in that it reduces the rate of curvature progressively as the concentration is increased, irrespective of whether the overall extension growth of the roots is being stimulated (10 and 30 p.p.m.) or inhibited (100 p.p.m.). Correspondingly the reaction time is lengthened by 25–50% in all concentrations. Studies of responses in mixtures of growth-stimulating concentrations of NMSP (30 p.p.m.) and growth-inhibiting concentrations of IAA (10^{-8}) and 2:4-D

(3×10^{-8}) show that auxins and 'anti-auxins' are mutually antagonistic in most, if not all, their actions on growth and curvature. The results suggest that the anti-auxin NMSP may stimulate root growth and inhibit curvature by interfering with the synthesis or distribution of a natural endogenous inhibitor, which is not IAA. NMSP inhibition of root growth in high concentrations must, however, be exerted independently of this natural inhibitor. The mutual antagonisms shown between the auxins and NMSP are best explained in terms of an interference with access to the growth centres; competitive action at the growth centres themselves seems not to be involved. [From authors' summary.—Bedford Coll., Univ. London. [For part 1 see *H.A.*, 27: 2048.]

3049. Norman, A. G.
Growth repression of higher plants by 2-pyridinethiol, 1-oxide.
Plant Physiol., 1957, **32**: 16-19, bibl. 8, illus.

The fungicidal compound 2-pyridinethiol, 1-oxide and certain of its derivatives, when applied at low concentrations, repressed root elongation and dry matter accumulation in cucumber seedlings; applications of similar concentrations to the aerial parts of several species (including bean, tomato, cucumber, pea and petunia) did not appear to affect top growth or development. High concentrations of the compounds were lethal.—Univ. Mich., Ann Arbor.

3050. Brian, P. W., and Grove, J. F.
Gibberellic acid.
Endeavour, 1957, **16**: 161-71, bibl. 30.

The authors deal first with the production of gibberellin and gibberellic acid. Next they discuss work on the effect of gibberellic acid on the extension growth of wheat, peas and sweet peas. They note that it has not been found to stimulate root growth. Although its physiological properties differ from those of auxins, the effects of the two substances would appear to be complementary. When applied to a cold-needing biennial such as *Hyoscyamus niger* gibberellic acid is capable of replacing the cold treatment necessary but not the long-day treatment necessary for flowering. It has been reported as breaking the dormancy of potato tubers and of lettuce seed. The authors state a guarded case in favour of its being akin to if not actually, a natural plant hormone. The prospects of its economic application in future are briefly considered in so far as its physiological effects are likely to bring about (1) an increase in dry weight of shoots, (2) increased height of main stem (in fibre plants), (3) flowering in biennials without cold treatment, and (4) dormancy breaking. Finally the chemistry of gibberellic acid is considered.

3051. Sachs, R. M., and Lang, A.
Effect of gibberellin on cell division in *Hyoscyamus*.
Science, 1957, **125**: 1144-5, bibl. 6, illus.

It has previously been shown that gibberellin, applied to non-vernalized biennial *Hyoscyamus niger*, would cause stem elongation [see *H.A.*, 26: 3271]. The present report shows that this stem elongation is the result of a great increase in the number of cell divisions in the sub-apical region of the stem, thus proving that gibberellin may function as a regulator not only of cell elongation but also of cell division. Longitudinal division was increased to a much greater extent than transverse division, and the apical region was not affected.—Univ. Calif., Los Angeles.

3052. Lockhart, J. A.
The light requirement for a gibberellic acid response in dwarf bean seedlings.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xlviii.

Dwarf bean seedlings did not respond to applied gibberellic acid when grown in complete darkness. Growth was markedly stimulated when GA was applied in the presence of red light. The same response has been found in climbing beans.—Calif. Inst. Tech., Pasadena.

3053. Vlitos, A. J., and Meudt, W.
Relationship between shoot apex and effect of gibberellic acid on elongation of pea stems.
Nature, 1957, **180**: 284, bibl. 4.
Interactions between gibberellic acid and the shoot apex of Alaska pea seedlings.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xlvii.

Pea seedlings were decapitated and/or derooted or left intact, and immersed in a gibberellic acid solution or distilled water, in red light or darkness. Intact seedlings responded more markedly to gibberellic acid in red light than in the dark. Decapitated, rooted seedlings made little growth under any conditions. De-rooted seedlings with shoot tips responded to gibberellic acid more markedly in red light than in darkness, but de-rooted, decapitated seedlings showed no response in either light condition. It is concluded that the shoot apex is necessary for maximum elongation of the second internode, and that gibberellic acid will not replace the stimulus for cellular extension that is probably derived from the apex.—Boyce Thompson Inst., New York.

3054. Wittwer, S. H., and Bukovac, M. J.
Gibberellin effects on temperature and photoperiodic requirements for flowering of some plants.
Science, 1957, **126**: 30-1, bibl. 9.

Biennials, which normally require cold to flower, were induced to flower at temperatures slightly above the known inductive temperatures by application of gibberellin. Long-day annuals were induced to flower in short-day conditions by gibberellin treatment.—Mich. St. Univ., E. Lansing.

3055. Langridge, J.
Effect of day-length and gibberellic acid on the flowering of *Arabidopsis*.
Nature, 1957, **180**: 36-7, bibl. 5, illus.

Experiments are described on the rapidly growing race Estland which does not respond to vernalization. A highly significant acceleration of flowering was found when plants were treated with gibberellic acid and grown under an 8-hr. day. The effects resulting from treatment with different amounts of the acid are shown and briefly discussed. It is noted that the effects on the long-short-day *Bryophyllum* and the facultative long-day *Arabidopsis* are in the nature of accelerations of flowering, but that it remains to be seen whether the substance will cause flower formation in an obligate long-day plant.

3056. Wittwer, S. H., and others.

Some effects of gibberellin on flowering and fruit setting.

Plant Physiol., 1957, **32**: 39-41, bibl. 10, illus.

Gibberellin (GB) applied at low concentrations in lanolin paste effectively induced parthenocarpy in tomatoes. Flowering in Contender beans was earlier and vegetative growth was greater after GB application. In the tomato varieties PI-205046 and Early Chatham earlier and more prolific flowering was induced by GB; the effect was correlated with more rapid growth, although node number to flowering was not affected. Marked stem elongation occurred in lettuce and cabbage plants within 5 to 7 days of apical applications of 5 to 20 μg. GB.—Mich. St. Univ., East Lansing.

3057. Scott, R. A., Jr., and Liverman, J. L.

Control of etiolated bean leaf-disk expansion by gibberellins and adenine.

Science, 1957, **126**: 122-4, bibl. 9.

Etiolated leaf discs of beans were given light and growth substance treatments. Leaf disc growth was promoted by adenine and thiopurinesuccinic acid, irrespective of the type of light. Gibberellins also promoted leaf expansion in darkness and in red light. The gibberellin effect was reversed by far-red light.—Texas agric. Exp. Stat., College Station.

3058. Haber, A. H., and Tolbert, N. E.

Photosynthesis in gibberellin-treated leaves.

Plant Physiol., 1957, **32**: 152-3, bibl. 3.

Experiments with detached leaves and intact seedlings of peas indicated that gibberellic acid did not enhance the rate of CO_2 fixation per unit of leaf tissue and did not alter the general pathways of short-time metabolism of the newly fixed $C^{14}O_2$ in the sugars, organic acids and amino acid products.—Oak Ridge nat. Lab., Tenn.

3059. Barton, L. V., and Fine, J. M.

The effect of gibberellic acid on disease control.

From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xxxiii.

Preliminary tests conducted in the greenhouse have shown that gibberellic acid can be used in combination with either Captan or Manzate for the control of early blight of tomatoes without decreasing the effectiveness of the fungicide. Furthermore, the presence of the fungicide does not reduce the effect of the gibberellic acid in increasing the growth of the tomato plant, and the gibberellic acid itself acts to reduce the incidence of disease. Limited tests with halo blight of beans also indicated that gibberellic acid can be used with Agrimycin without affecting the control of the disease by the latter, and Agrimycin does not invalidate the growth-promoting properties of the gibberellic acid on the beans.—Boyce Thompson Inst., N.Y.

Biochemistry.

(*See also* 3089p, q, v-z, 3090a, b, g, s, u, 4008.)

3060. Nicholas, D. J. D., Lloyd-Jones, C. P., and Fisher, D. J.

Some problems associated with determining iron in plants.

Plant and Soil, 1957, **8**: 367-77, bibl. 17.

Washing tomato leaves for 30 sec. in 0·3% Teepol and rinsing for 30 sec. in distilled water completely removed contaminant Fe from the surfaces without affecting internal Fe. Unwashed leaves from tomato plants grown in a dust-proof chamber showed differences in Fe status consistent with chlorosis.—Long Ashton Res. Stat., Univ. Bristol.

3061. Dugger, W. M., Jr.

Autoradiography with plant tissue.

Bot. Rev., 1957, **23**: 351-87, bibl. 198.

The subject is reviewed under the following main headings: Photographic emulsion as a measuring instrument and terminology, Physical principles, Methods in autoradiography, and Application of autoradiography in plant studies. The author sums up as follows: "Autoradiography, a technique combining radiochemistry, microtechnique and photography, offers another method for studying the morphology, physiology and cytology of plants. As applied to higher plants, the technique has not been thoroughly investigated; however, autoradiograms have been made that show not only good cellular detail but also developed grains of high photographic resolution associated with the cell components. The techniques of autoradiography in plants should be useful in elucidating such problems as organic transport, inorganic absorption, cytological incorporation and synthesis in plants." —Fla agric. Exp. Stat., Gainesville.

3062. Langston, R.

Distribution patterns of radioisotopes in plants.

Proc. Amer. Soc. hort. Sci., 1956, **68**: 370-6, bibl. 6, illus.

Autoradiographic techniques were utilized in determining the distribution patterns of cobalt-60, calcium-45, sulfur-35, zinc-65, iron-55, phosphorus-32, molybdenum-99, selenium-75, iodine-131, and chlorine-36 in tomato and peppermint plants. The results indicate that each radioisotope possesses a rather specific area of accumulation and these areas, as viewed within a whole plant, show characteristic distribution patterns in all other plants tested. It was pointed out that these distribution patterns bear a marked similarity to known deficiency symptoms or patterns. [Author's summary.]—Purdue Univ., Ind.

3063. Langston, R.

Studies on marginal movement of cobalt-60 in cabbage.

Proc. Amer. Soc. hort. Sci., 1956, **68**: 366-9, bibl. 2, illus.

Cabbage seedlings absorbed cobalt-60 from sand culture solutions and transported it to the leaf margins, where it accumulated and was excreted to the outer leaf surface. These observations were supported by autoradiographic techniques and activity determinations. [Author's summary.]—Purdue Univ., Ind.

3064. Gustafson, F. G.

Comparative absorption of cobalt-60 by upper and lower epidermis of leaves.

Plant Physiol., 1957, **32**: 141-2, bibl. 7.

Plants tested included nasturtium (*Tropaeolum majus*), bean (*Phaseolus vulgaris*), cucumber, cabbage and *Clivia miniata*. Differential absorption of Co was not correlated with frequency of stomata. In beans the lower and in cabbage the upper surface absorbed the greater amount of Co. In the remaining 3 plants the two surfaces were equal in absorption capacity.

3065. Biswas, B. B., and Sen, S. P.
Tracer studies on sulphur metabolism in plants. I. The path of sulphate reduction.
Sci. and Cult., 1957, **22**: 697-9, bibl. 4, illus.

$Na_2S^{35}O_4$ fed through the roots of 10-day-old pea plants was transported to the topmost leaves in under 15 minutes, and after 1 hour's uptake 25 S compounds had been formed in these leaves. In lower leaves both S uptake and the number of S compounds formed were considerably less. Studies on sulphate reduction in pea leaves, onion roots and other plants indicated that the main pathway involved taurine formation at an early stage, but there was also evidence of a second pathway involving cysteic acid.—Radiochem. Lab., Bose Inst., Calcutta.

3066. Sapožnikov, D. I., Krasovskaja, T. A., and Maevskaja, A. N.
Changes in the ratio between the main carotenoids in the plastids of green leaves on exposure to light. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **113**: 465-7, bibl. 4.

Experiments conducted on the leaves of *Cyclamen persicum*, *Polygonum sacchalinense*, *Vicia faba* and *Taraxacum officinale* showed that light intensity had no effect on the content of carotene or neoxanthin but affected that of lutein and violaxanthin. At high light intensity the content of lutein increased and that of violaxanthin decreased. Even at 5,000 lux an appreciable difference in the ratio of the two pigments was noted and the difference increased up to 80,000 lux, the combined percentage remaining constant. Reduction of light intensity reversed this process.

3067. Rabin, R. S., and Klein, R. M.
Chlorogenic acid as competitive inhibitor of indoleacetic acid oxidase.
Arch. Biochem. Biophys., 1957, **70**: 11-15, bibl. 15.

An enzyme system oxidizing indoleacetic acid was isolated from pea epicotyls. It had an optimal activity at pH 5·6. Chlorogenic acid was a competitive inhibitor for the oxidase *in vitro*. Caffeic acid inhibited IAA oxidase in a noncompetitive fashion, and quinic acid, the other moiety of chlorogenic acid, was inactive. [Authors' summary.]—N.Y. bot. Gdn, Bronx Park.

3068. Eberhardt, F., and Martin, P.
Das Problem der Wurzelausscheidungen und seine Bedeutung für die gegenseitige Beeinflussung höherer Pflanzen. **(The problem of root excretions and their importance in the mutual relationships between higher plants.)** [English summary 10 lines.]
Z. PflKrankh., 1957, **64**: 193-205, bibl. 37, illus.

The liberation of fluorescent compounds by roots of *Lolium*, *Nigella* and *Papaver* seedlings was studied by means of paper chromatography. It is concluded that true root excretions play only a minor part in the mutual interactions of plants growing in association with one another.—Inst. PflSchutz, Landw. Hochsch. Hohenheim, Stuttgart.

3069. Siegel, S. M.
Growth- and enzyme-inhibiting properties of bean seed extracts.
Plant Physiol., 1957, **32**: 151-2, bibl. 3.

Germination, growth and enzyme activity of flax seeds were inhibited by extracts from kidney bean seed coats. It is suggested that phenols contained in the latter either interfered directly with protein synthesis or were first converted into highly toxic quinonoid substances by endogenous tissue peroxidase.—Univ. Rochester, N.Y.

Nutrition.

(*See also* 3089c, s, 3242-3246, 3418, 3642, 3998, 4004.)

3070. Poljanskij, N. A.
Sapropel—a valuable fertilizer. [Russian.]
Sad i Ogorod, 1957, No. 5, pp. 29-31, illus.

Sapropel, a marine, estuarine or lacustrine sediment consisting mainly of organic debris, applied alone, mixed with FYM or composted with the latter substantially increased tomato, cabbage and potato yields. The best results were obtained from application of 15 tons of sapropel composted with 5 tons FYM plus 3 centners of phosphate fertilizer per ha. Methods of obtaining, drying and using sapropel are described, and the chemical composition of samples from 2 lakes and ponds is given. Sapropel was found to be rich in Ca and particularly suitable for acid soils of low organic content.

3071. Gauch, H. G.
Mineral nutrition of plants.
Annu. Rev. Plant Physiol., 1957, **8**: 31-64, bibl. 205.

The following aspects are reviewed: the salt absorption process, translocation, the functions or roles of elements, interrelationships of elements, and chlorosis.

3072. Nezgovorova, L. A.
Effect of nitrogen nutrition of plants on fixation in the dark of CO_2 by leaves. [Russian.]
Fiziol. Rast., 1956, **3**: 343-51, from abstr. in *Soils and Ferts*, 1957, **20**, abstr. 1378.

In water cultures, N applied during growth to tobacco, sunflower, cucumber and bean plants previously deficient in N increased the protein content of the leaves and $C^{14}O_2$ fixation in the dark. $C^{14}O_2$ was fixed mainly as amino acids, ascorbic acid and malic acid.

3073. Estes, E. E., and O'Kelley, J. C.
Phosphorus-32 uptake and localization correlated with photosynthetic factors in selected higher plants.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xxiv.

Autoradiographs were made of variegated leaves of *Coleus*, *Caladium* and *Pelargonium* supplied with P^{32}. Under approximately equal light and dark periods of 10–12 hours' duration P^{32} became more concentrated in the green than in the non-green areas of the variegated leaves. In *Coleus* under prolonged light a progressive increase of P^{32} in the non-green area was observed, followed by a depletion in a subsequent dark period. Phosphorus-32 was supplied to illuminated lima bean seedlings, one leaf of the first pair being exposed to normal air, the opposite to CO_2-free air. A significant increase in the uptake of P^{32} occurred in leaves exposed to CO_2-free air.—Univ. Alabama, Tuscaloosa.

3074. HUBBARD, R. D., AND OTHERS.
Agricultural frits as a source of trace elements.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 455-63, bibl. 17.

It has been found that the slow decomposition of glass frits under soil conditions gives a controlled supply of trace elements in amounts below toxic levels. The trials carried out from 1952–55 and here described indicate that the later developed frits 628 and 253 A are probably superior to the older ones RL-95 and 153 in this respect.—Rutgers Univ., New Brunswick.

3075. AGAFONOVA, A. F.
The effect of boron in conjunction with liming on the chemical composition of plants. [Russian.]
Tr. Vses. n.-i. in-ta udobr. agrotehn. i agropovčoved., 1955, No. 31, pp. 331-47, from abstr. in *Ref. Ž. (Biol.)*, 1957, No. 6, abstr. 22382.

The effect of liming and B fertilizers on the B, P and Ca content of 14 plants, including tomato, radish, sorrel, *Nicotiana rustica*, rhubarb and begonia, was studied in pot experiments. Liming reduced the B content, especially in dicotyledons, the reduction being greatest in the upper leaves but negligible in stems, roots and lower leaves. B fertilizers increased the relative and absolute B contents. No consistent effect of lime and B was found on the total P content of the leaves. In contrast to lime B increased the relative content of organic phosphates in the leaves of certain plants including radish. Ca content increased under the influence of liming and B, less in monocotyledons than in dicotyledons. An effect of organic acid composition of plant sap with acid reaction was noted on changes in the Ca content of leaves during liming: in begonia (mainly oxalic acid) the Ca content increased, whereas in *Nicotiana rustica* and rhubarb (limonic and malic acids) it decreased, but was again increased by B application.

3076. HUMPHRIES, E. C.
Effect of boron on production of adventitious roots.
A.R. Rothamsted exp. Stat., 1956, 1957, p. 79.

Primary leaves of B-deficient dwarf bean seedlings were larger than those of normal seedlings. After removal of the roots and hypocotyl base, seedlings in B-free solutions in light or darkness responded to foliar application of B by increased root production from the hypocotyl. Foliar application of sucrose had a similar effect in darkness, but decreased root formation in the light. There was no evidence of an additive effect when both B and sucrose were used. In the light roots appeared on the epicotyl and upper hypocotyl, in the dark mainly on the lower hypocotyl. The experiments will be continued.

3077. O'KELLEY, J. C.
Boron effects on growth, oxygen uptake and sugar absorption by germinating pollen.
Amer. J. Bot., 1957, **44**: 239-44, bibl. 19, illus.

Pollen of *Tecoma* [*Campsis*] *radicans* was germinated in media containing glucose, fructose or sucrose, and boron in various concentrations. When sucrose was used oxygen uptake and sugar absorption were stimulated by the addition of B up to and including 100 p.p.m. With glucose the results were similar except that 100 p.p.m. B inhibited oxygen uptake slightly. When fructose was used, however, there was little evidence that B increased either oxygen uptake or sugar absorption, and clear evidence of inhibition of both these processes at the 100 p.p.m. B level. The similarity of the effects of B on sugar absorption and oxygen uptake indicates a close relationship between these processes. B effects on pollen tube elongation, however, appear to be quite different, and it is concluded that B plays a specific role in pollen tube growth which is not closely related to the effect of B on either sugar absorption or respiration.—Univ. Ala, Tuscaloosa.

3078. HURD, R. G., AND SUTCLIFFE, J. F.
An effect of pH on the uptake of salt by plant cells.
Nature, 1957, **180**: 233-5, bibl. 16.

In red beet root tissue it was found that the rate of absorption of K^+ ions from a potassium chloride solution was much greater at pH 8·5 than at pH 6, and at saturation the total amount of K^+ in the discs at pH 8·5 was approximately twice that in the discs at pH 6. The rate of chloride uptake was approximately the same at both pH levels. In a comparative test with different kinds of tissue the greatest stimulation of cation absorption by alkaline solution was observed in phloem tissue from parsnip roots; in white beet root tissue, artichoke tuber tissue and carrot tissue the effects were similar to those obtained with red beet. In swede hypocotyl K^+ uptake was the same at both pH levels. It is concluded that the effects of pH observed were related to the presence of bicarbonate ions in the alkaline solution.—King's Coll., Univ. London.

Soil and water.

(*See also* 3089h, l, u.)

3079. BROOKLYN BOTANIC GARDEN.
Handbook on mulches.
Brooklyn bot. Gdn Rec., 1957, **13**(1): 1-79, illus.

This number of the journal consists of a series of useful short articles by American authorities on various aspects of mulching. The subjects covered include mulching practices at the Arnold Arboretum, the Longwood Gardens, Pa, and the Brooklyn Botanic Garden; the effect of mulching on plant diseases; mulches for small fruits, various ornamental plants and lawns; and notes on a wide range of mulch materials including wood chips, sawdust, black plastic, paper pulp, gravel, aluminium foil, corncobs and asphalt.

3080. BADANOVA, K. A.
Effect of heavy water on plants. [Russian.]
Fiziol. Rast., 1956, **3**: 43-8, from abstr. in *Soils and Ferts*, 1957, **20**, abstr. 1383.

Water containing 20% or more of heavy water impaired germination of wheat, pea and sunflower seeds, the harmful effect increasing with increasing concentrations of heavy water. Heavy water inhibited saccharase, papain and perioxidase activity.

3081. Bjallovič, Ju. P.
Degree of resistance to flooding in certain species of trees and shrubs. [Russian.]
Bot. Žurnal, 1957, **42**: 734-41, bibl. 19.

The reaction of plants to flooding largely depends on the temperature and rate of flow of the floodwater, fast, cold waters being the least and still, warm ones the most harmful. More than 200 species of woody plants are listed here in 13 groups according to degree of tolerance to different types of flooding. Among fruit trees quince was found to be the most tolerant while peach, almond, sweet chestnut, *Actinidia* spp. and tung were among the least tolerant to flooding.

3082. Stippler, H. H.
Sprinkler irrigation in the Pacific Northwest.
Agric. Inf. Bull. U.S. Dep. Agric. agric. Res. Serv. **166**, 1956, pp. 265, bibl. 11.

Most of the details very lavishly given refer to irrigation of pastures or agricultural land, but an appreciable amount of irrigation is practised in orchards and the cultivation of vegetables and row crops and this is also dealt with here. Irrigation design and layout, operation, operation costs and investment costs are detailed for the different crops irrigated.

Machinery and apparatus.

(*See also* 3090o, q, t, 3091, 3172, 3235, 3337n, 4029k.)

3083. Wiersema, G. P.
De lier in de tuinbouw. **(The winch in horticulture.)** [English summary 10 lines.]
Meded. Dir. Tuinb., 1957, **20**: 289-91, 302, illus.

The advantages and uses of a winch in horticulture are discussed. For lifting, a single-drum type of winch should be used, but for other work a double-drum type is recommended.

3084. Sweetman, I. C.
A suction-operated precision seeder.
N.Z. J. Sci. Tech., Sect. A., 1957, **38**: 577-82, bibl. 1, illus.

The precision seeder described has been devised to sow small seeds singly at adjustable spacing by means of section applied to fine-bore tubes. Suction is obtained from the tractor induction manifold or from a small vacuum pump driven from the power take-off. Though designed primarily to sow clover seeds, tests have shown satisfactory performances with other seeds including those of several vegetables.—Rukuhia Soil Res. Stat., Hamilton.

3085. Goidànich, G., Canova, A., and Maccaferri, E.
La cella termo-igrostatica dell'istituto di patologia vegetale di Bologna. **(The thermo-hygrostatic cabinet of the Plant Pathology Institute of Bologna.)**
Reprinted from *Atti Accad. Sci. Ist. Bologna*, 1956, Vol. 3, pp. 7, illus.

A detailed description of a two part plant cabinet 2 m. long, 1·95 m. high and 0·95 m. across in which temperatures can be varied as desired between 5° and 50° C. with an accuracy of within 0·5°, humidity between 10% and 99% with an error not exceeding 1%, ventilation can be regulated and daylight or electricity is used as the source of light.

Marketing.

3086. Bennett, L. G.
The marketing of horticultural produce grown in Bedfordshire, West Cornwall, Wisbech and the Lea Valley.
Misc. Studies Dep. agric. Econ. Univ. Reading **12**, 1957, pp. 103, 10s.

This report deals with the marketing of brussels sprouts and the main vegetable crops in Bedfordshire, winter cauliflower and early potatoes in Cornwall, top and soft fruit in Wisbech and glasshouse produce in the Lea Valley. The main aspects covered are (1) the crops grown and conditions under which they are produced; (2) preparation for market; (3) methods of sale; (4) place of marketing; and (5) means of transport. Some information is given on costs. The findings are analysed statistically and discussed.

3087. Clark, J. M.
The direction of fruit and vegetable marketing in Queensland.
Quart. Rev. agric. Econ., Canberra, 1957, **10**: 22-8.

An account is given of the activities of the "Committee of Direction of Fruit Marketing" (C.O.D.), which executes marketing policies for particular fruits and vegetables that are decided by the growers themselves. There are now 6 sectional group Committees empowered to issue directions concerning the grading, movement, etc., of bananas, pineapples, deciduous fruits, citrus fruits, other fruits and vegetables. The methods adopted by C.O.D. are unique in Australia and are thought to have no exact parallel overseas.

3088. Spangler, R. L.
Standardization and inspection of fresh fruits and vegetables.
Misc. Publ. U.S. Dep. Agric., agric. Mktg Serv. **604**, revised 1956, pp. 32.

The history and development of U.S. standards by the Fruit and Vegetable Division of the Agricultural Marketing Service and its predecessors are discussed. This is followed by an account of how these standards are applied in practice by the Government Inspection Service.

Noted.

3089.

a Åberg, B.
Auxin relations in roots.
Annu. Rev. Plant Physiol., 1957, **8**: 153-80, bibl. 160.

b Aldrich, F. D., and McLane, S. R., Jr.
A paper chromatographic method for the detection of 3-amino-1,2,4-triazole in plant tissues.
Plant Physiol., 1957, **32**: 153-4.

c Ashwin, P. M., and Ritchie, J. A.
Determination of magnesium in plant ash.
N.Z. J. Sci. Tech. Sect. B, 1957, **38**: 447-50, bibl. 2.
By titration with EDTA.

d AVERY, G. S., JR.
Botanic gardens—what role today? An "operation bootstraps" opportunity for botanists.
Amer. J. Bot., 1957, **44**: 268-71, bibl. 1.
Educational possibilities for the amateur are discussed.

e BEAN, G.
Controlled atmosphere in the propagating house.
Agric. Rev. Lond., 1957, 3(3): 18-21, bibl. 4.
Technical problems of intermittent mist application for cuttings.

f BENNETT, L. G.
The wholesale trade in horticultural produce in Smithfield market, Birmingham.
Misc. Studies Dep. agric. Econ. Univ. Reading **13**, 1957, pp. 30, 4s. 6d.

g BRADLEY, D. E., AND JUNIPER, B. E.
Electron microscopy of leaf surfaces.
Nature, 1957, **180**: 330-1, bibl. 2, illus.
Used in a study on the effects of selective herbicides.

h CODE, W. E.
Farm irrigation structures.
Bull. Colo agric. Exp. Stat. **496-S**, 1957, pp. 60, illus.
Ditches, flumes, pipes, reservoirs, etc., for surface irrigation.

i COOPER, G. R.
A remote reading multiple electronic thermometer.
Misc. Pub Me agric. Exp. Stat. **630** [undated, received 1957], pp. 4, illus.
Light, portable and designed to take rapid temperature readings.

j DANIELSON, L. L., AND BRITTINGHAM, W. H.
An electronic temperature integrator for plant physiological research.
Plant Physiol., 1957, **32**: 142-6, bibl. 4, illus.
For preparing degree-hour records.

k DAVIS, M. B.
Education and research in the field of horticulture.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 605-10.
With special reference to Canada.

l ELLIS, H. M., AND WILSON, T. V.
Farm irrigation.
Ext. Circ. N.C. agric. Ext. Serv. **400**, 1956, pp. 28, illus.
Water supply, rate of application, equipment and layout of sprinkler irrigation for horticultural crops.

m FERREIRA CARRETO, A.
O problema da precipitação artificialmente provocada. **(The problem of artificially induced rainfall.)** [French and English summaries 7 lines each.]
Agron. angol., 1956, No. 10, pp. 77-125, bibl. 57.

n FRYXELL. P. A.
Mode of reproduction of higher plants.
Bot. Rev., 1957, **23**: 135-233, bibl. 482.
Tabulated data on sexual reproduction in many species of over 500 genera.

o GAREY, C. L.
Height board for field data and photographic record.
Agron. J., 1957, **49**: 389-90, illus.
Used at Ark. agric. Exp. Stat. to record growth response in photographs.

p GRIFFITHS, L. A.
Separation and identification of aromatic acids in plant tissues by paper chromatography.
Nature, 1957, **180**: 286-7, bibl. 4.
Method developed for cacao.

q GWIRTSMAN, J., MAVRODINEANU, R., AND COE, R. R.
Determination of fluorides in plant tissue, air, and water. Apparatus and procedures.
Analyt. Chem., 1957, **29**: 887-92, bibl. 9, illus.
With examples of results obtained with apple and tea leaves.

r HILLMAN, W. S., AND GALSTON, A. W.
Inductive control of indoleacetic acid oxidase activity by red and near infrared light.
Plant Physiol., 1957, **32**: 129-35, bibl. 20.
In pea tissue.

s HOFMANN, E.
Einfluss der Pflanzennährstoffe auf die Aktivität der Phosphatasen (Phosphomonoesterasen). **(The influence of plant nutrients on the activity of phosphatases (phosphomonoesterases).)**
Arch. Biochem. Biophys., 1957, **69**: 33-6, bibl. 6.
Increased in leaves by K and reduced by N.

t ILJIN, W. S.
Drought resistance in plants and physiological processes.
Annu. Rev. Plant Physiol., 1957, **8**: 257-74, bibl. 108.

u JACKS, H.
Disinfection of nursery soil.
Bull. N.Z. Dep. Agric. **363**, revised 1957, pp. 12, bibl. 8, illus.
For first edition see *H.A.*, 23: 3753.

v KELLY, W. C.
Sampling leaves for vitamin analysis.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 596-600, bibl. 3.
Problems and methods discussed, with particular reference to ascorbic acid in turnip leaves.

w Kick, H., and Bucher, R.
Zur flammenphotometrischen Bestimmung des Magnesiums in Pflanzenaschen sowie des pflanzenverfügbaren Magnesiums in Böden nach Schachtschabel. **(The determination by flame photometry of magnesium in plant ash and of available magnesium in soils, based on the methods of Schachtschabel.)** [English and French summaries ¼ p. each.]
Landw. Forsch., 1957, **10**: 96-9, bibl. 7.

x van der Merwe, A. J., and de Wet, A. F.
The potentialities of Southern Rhodesia for the production of horticultural crops, with special reference to the eastern districts.
Rhod. agric. J., 1957, **54**: 235-63, bibl. 11, illus.
Deciduous, tropical and sub-tropical fruits and vegetables.

y Parra H., J.
Interferencias en fotometría. **(Interferences in photometry.)**
Cenicafé, 1957, **8**(1): 28-31, bibl. 8.
Determination of Ca, Mg and K in plant material.

z Plaisted, P. H.
Clearing plant extracts for amino acid determination by paper chromatography.
Abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xiii.
Method described.

3090.

a Porter, C. A., Margolis, D., and Sharp, P.
Quantitative determination of amino acids by paper chromatography.
Contr. Boyce Thompson Inst., 1957, **18**: 465-76, bibl. 11.
In plant extracts.

b Puffeles, M., and Nessim, N. E.
Comparison of flame-photometric and chemical methods for determining sodium and potassium in soil, plant material, water and serum.
Analyst, 1957, **82**: 467-74, bibl. 22.
Description of work by authors under the Ministry of Agriculture, Tel-Aviv, Israel, and discussion of the work of others.

c Quiceno H., G.
Procedimientos de 'confounding' en factoriales de 2^n. **(Procedures for confounding in 2^n factorials.)**
Cenicafé, 1957, **8**(1): 15-27, bibl. 4.
Includes examples from fertilizer experiments with coffee and lettuce.

d Raggio, M., Raggio, N., and Torrey, J. G.
The nodulation of isolated leguminous roots.
Amer. J. Bot., 1957, **44**: 325-34, bibl. 16, illus.
Bean roots cultured on agar.

e Rebstock, T. L., and others.
Effect of chemical structure on the growth inhibition of plants with some acid analogs of 2-mercaptobenzimidazole.
Plant Physiol., 1957, **32**: 19-22, bibl. 5, illus.
On growth inhibition in beans and root development in cucumbers.

f Robbins, W. J.
Physiological aspects of aging in plants.
Amer. J. Bot., 1957, **44**: 289-94.
A discussion on ageing of seeds, individual plants, cells and meristems.

g Salibe, A. A., and Crocomo, O. J.
Comparação de métodos para a determinação quantitativa do N total. **(Comparison of methods for determining total N.)** [English abstract 8 lines.]
Solo, 1956, **48**(1): 35-47, bibl. 5.
In plant material.

h Scott, B. I. H.
Electric oscillations generated by plant roots and a possible feedback mechanism responsible for them.
Aust. J. biol. Sci., 1957, **10**: 164-79, bibl. 20, illus.
In broad beans. For earlier work see *H.A.*, 25: 3455.

i Šemahanova, N. M.
The rôle of mycorrhizal fungi in the nutrition of woody plants. [Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1957, No. 3, pp. 317-30, bibl. 33, illus.
Probably supplying vitamins; experiments on pine and oak seeds and seedlings.

j Stolwijk, J. A. J.
Some characteristics of internode elongation.
Reprinted from *Proc. 1st int. photobiol. Congr., 1954*, Amsterdam, pp. 78-82 [received 1957].
As affected by the spectral composition of light.

k Stolwijk, J. A. J., and Zeevaart, J. A. D.
Wave length dependence of different light reactions governing flowering in *Hyoscyamus niger*.
Reprinted from *Proc. kon. ned. Akad. Wetensch. Ser. C*, 1955, **58**: 386-96, bibl. 12, illus.

l Stoughton, R. H., and Vince, D.
Use of artificial light in horticulture.
Agric. Rev. Lond., 1957, **3**(3): 8-15, illus.
For improving seedling growth, controlling flowering of glasshouse crops and forcing bulbs.

m Stowe, B. B., and Yamaki, T.
The history and physiological action of the gibberellins.
Annu. Rev. Plant Physiol., 1957, **8**: 181-216, bibl. 202.
With emphasis on Japanese literature.

n STRÄTER, G.
Erhebungen über Schwefelgehalte der Luft im Dienst der Rauchschadendiagnose. **(Recording the sulphur content of the air as a means of smoke damage diagnosis.)** [English and French summaries 12 and 16 lines respectively.]
Landw. Forsch., 1957, **10**: 146-52, bibl. 9, illus.
By a portable electronic micro-gas analysis apparatus.

o TAAL, M. M., AND SPOELSTRA, P. A.
Verwarmingsketel. **(Glasshouse boiler.)**
Beproevingsrapport I.T.T. Wageningen **19/3131**, 1956, pp. 5, illus.
Tests with a solid fuel boiler of Dutch make, "Rainchon".

p TUKEY, H. B., JR., WITTWER, S. H., AND TUKEY, H. B.
Leaching of carbohydrates from plant foliage as related to light intensity.
Science, 1957, **126**: 120-1, bibl. 7.
A direct, positive relationship found in bean leaves.

q VEERMAN, J. A.
Machinaal oogsten van bol- en wortelgewassen. **(Mechanical harvesting of bulb and root crops.)** [English summary 10 lines.]
Meded. Dir. Tuinb., 1957, **20**: 292-3, 302, illus.
Progress in the development of machines for harvesting bulbs, onions, carrots, chicory and beetroot.

r WASSINK, E. C.
A spherical radiation meter for plant irradiation purposes.
Reprinted from *Proc. 1st int. photobiol. Congr., 1954*, Amsterdam, pp. 299-303, bibl. 3, illus. [received 1957].
Not sensitive to the direction of incident light.—Wageningen.

s WEBSTER, G. C., BERNER, R. A., AND GANSA, A. N.
The effect of biuret on protein synthesis in plants.
Plant Physiol., 1957, **32**: 60-1, bibl. 8.
Inhibited in *Xanthium*.

t WEGENAAR, C.
Machinaal poten en planten. **(Mechanical planting.)** [English summary 6 lines.]
Meded. Dir. Tuinb., 1957, **20**: 286-9, 302, illus.
Of bulbs and plants.

u WILLIAMS, A. H.
The simpler phenolic substances of plants.
J. Sci. Food Agric., 1957, **8**: 385-9, bibl. 10.
A review of the occurrence of flavonoids and simpler compounds.

v WRIGHT, W. J.
The application of work study to horticulture.
Comm. Gr, 1957, No. 3210, pp. 77-9, and No. 3212, pp. 165-70, bibl. 45, illus.
A review.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 3089x, 3189i, q, u, 3190a, h, i, 3340, 4002, 4019.)

3091. BURRELL, A. B.
New developments in machinery and equipment.
A.R. pomol. Fruit Growing Soc. Que., 1956, pp. 42-8.

A discussion of available mechanical aids for orchard operations such as planting, cultivation, mulching, fertilizing, spraying, rodent control, pruning and picking, and for post-harvest operations such as handling boxes of apples and grading.

3092. PEARCE, S. C.
Some considerations in deciding plot size in field trials with trees and bushes.
J. Indian Soc. agric. Statist. 1955, **7**: 23-6, bibl. 4.

The author concludes his disquisition as follows: "In general, problems concerning plot size can be settled by the rule given by Fairfield Smith for the variation due to soil heterogeneity; with trees and bushes, however, much of the variation is due to other causes. Also, where guard rows are called for, the wastage of material that results depends very much on the size of the plot chosen and further, if it is intended to calibrate the plants before experimental use, the coefficient of correlation obtained is often greater for larger plots. On account of the difficulty of dealing with trials in which a high proportion of the trees in certain plots is missing, it is recommended that plots should be either large or small and not of medium size; a conclusion that can also be reached from practical considerations." [Author's summary.]

3093. BLAIR, D. S.
Apple investigations.
A.R. pomol. Fruit Growing Soc. Que., 1955, pp. 35-45.

A review of work at the Horticultural Substation, Smithfield, Ontario, on breeding, varieties, cropping, pruning, rootstocks, double-working and chemical thinning.

3094. BLAIR, D. S., AND OTHERS.
Trends in apple production in Quebec.
A.R. pomol. Fruit Growing Soc. Que., 1956, pp. 27-41.

This brief survey of the apple industry in Canada with special reference to Quebec includes data on production by provinces and average farm prices for the past 21 years, and discusses varietal distribution, rootstocks, pruning, nutrition and spraying for cultural purposes.

3095. Magness, J. R.
Pear growing in the Pacific Coast States.
Fmrs Bull. U.S. Dep. Agric. **1739**, revised 1957, pp. 30, illus.

A factual account of pear growing practice in the 3 Pacific Coast States where 80% of the U.S. pear crop is produced. Conditions in the different districts are discussed and then all the factors certain to affect successful pear growing are considered in turn, including choice of stocks, varieties and pest and disease control. The chief varieties are Anjou, Bartlett [Williams], Bosc, Comice and Hardy.

3096. Washington State Fruit Commission.
Central Washington peach production costs, 1955.
Stats Circ. Wash. agric. Exp. Stats. **294**, 1956, pp. 12.

The data, which apply to the year 1955, were based on records taken from different sized farming groups in Yakima and Wenatchee districts. Elberta is the chief variety covering nearly 81% of the area under peaches, next comes Hale with 17%. Individual production costs varied from $36 [say £12 sterling] to $150 [£50] per ton, one half of the growers had costs between $66 and $99 a ton the average production cost being $69·9 [£23 3s.] a ton. A table sets out in great detail the break down of these costs into individual items.

3097. Neri, M.
L'albicocco: una drupacea trascurata dai genetisti. **(The apricot: a stone fruit neglected by breeders.)**
Frutticoltura, 1957, **19**: 279-84, illus.

Reference is made to uses of sweet and bitter apricot kernels in Italy. The varieties Mandorlona and Tonda di Tossignano are described. Suitable rootstocks and grafting systems are discussed.

3098. Passecker, F.
Untersuchungen und Beobachtungen über die Standortsansprüche des Kirschbaumes im Gebiete der Alpen, Apenninen und des Schweizer Jura. **(Studies and observations on the environmental requirements of cherry trees in the Alps, the Apennines and the Swiss Jura.)**
Gartenbauwiss., 1956, **21**: 378-95, bibl. 16, illus.

Climatic and soil requirements of cherries grown in some alpine regions of Austria, Switzerland and Italy have been studied. Cherries were found growing on light to medium soils, low in Ca, and also on heavy, calcareous soils. It is suggested that cherries can tolerate higher Ca contents in heavy soils than in lighter soils, owing to Ca retention by the colloids. Cherries growing in grass appeared to tolerate high Ca better than those grown where plant cover was scarce. [See also *H.A.*, 26: 219.]

3099. Duggan, J. B.
The planning of cherry orchards.
Agriculture, Lond., 1957, **64**: 122-3.

The author lists sweet cherries according to (1) their flowering and incompatibility groups, and (2) their order of ripening. For ease and economy of picking, planting in rows in the order of ripening of the varieties planted is highly desirable.

Breeding and varieties.

(*See also* 3189c, d, g, j, n, r, t, x, 3190b, c, k, l.)

3100. Pengelly, R.
Varieties of fruit trees, berry fruits and vines in Australia.
[*Publ.*] *Department of Health, Division of Plant Quarantine*, Canberra, 1957, pp. 32 (stencil).

Shows at a glance in what States different varieties of particular fruits can be found. For detail of exact location the reader is referred to the Chief Quarantine Officer, Plants, in the separate Departments of Agriculture.

3101. Brooks, R. M., and Olmo, H. P.
Register of new fruit and nut varieties. List 11.
Proc. Amer. Soc. hort. Sci., 1956: **68**: 611-31.

In list 11 brief descriptions are given of the following varieties: 43 apples, 4 apricots, 1 avocado, 1 blackberry, 4 blueberries, 3 cherries, 1 cherry plum, 1 cranberry, 1 fig, 1 gooseberry, 9 grapes, 1 grapefruit, 2 heartnuts, 1 mango, 8 nectarines, 1 orange, 18 peaches, 10 pears [7 of which are English varieties introduced by Laxton Bros.], 10 pecans, 12 plums, 9 raspberries, 20 strawberries and 12 walnuts.

3102. Klein, L. G.
Introducing the "Barry" apple.
Fruit Var. hort. Dig., 1957, **11**: 53, illus.

Barry, a McIntosh × Cox's Orange hybrid, produces a medium sized apple resembling McIntosh in colour and general appearance. Of very good quality it ripens about 2 weeks before McIntosh and has a cold storage life of about 4 months. As yet too little is known, however, about its production capabilities to warrant more than trial commercial plantings.—N.Y. St. agric. Exp. Stat., Geneva.

3103. (Pirovano, A.)
Le nuove pere italiane. **(New Italian pears.)**
Istituto di Frutticultura e di Elettrogenetica, Roma, 1956, 13½ × 9½ in., pp. 87, illus.

The institute is responsible for 15 of the new pears described with coloured illustrations, and Morettini for another two. They are classified according to season of ripening, 3 being in the summer, 9 in the winter and the rest in intermediate classes. The work, very briefly described, was started by Pirovano in 1925.

3104. Sharpe, R. H.
Okinawa peach resists root-knot nematodes.
Sunshine St. agric. Res. Rep., 1957, **2**(1): 18, illus.

The Okinawa peach, introduced to Florida in 1953, has proved exceptionally resistant to root-knot nematodes (*Meloidogyne* spp.) and also appears to be immune to the burrowing nematode [*Radopholus similis*]. Its winter chilling requirement is low. It is at present being tested as a rootstock and for crossing with high-quality varieties.

3105. Vallega, J., and de Terraciano, L. C.
Nuevas selecciones de duraznero. **(Newly selected peaches.)**
Idia, 1956, Nos. 106/8, p. 30.

Attempts to produce early ripening varieties have been successful in certain progeny of Elberta × Brigg's Red May and Elberta × Mayflower Nozzi. In these selections quality and hardiness are high; productive capacity has not yet been determined.

3106. Mácola, T., and Báez, J. R.
Durazno del palo. **(The 'pole' peach.)**
Idia, 1956, Nos. 106/8, p. 205.

This variety, with firm, almost woody flesh and fruits arising from branches and shoot bases, is probably a mutant from indigenous forms in the Cordoba province of Argentina. It has been successfully crossed with the varieties Novedad de Córdoba and Mayflower, and is being tested as a peach rootstock.

3107. Fogle, H. W.
Van and Sam cherries in central Washington.
Fruit Var. hort. Dig., 1957, **11**: 56-7, illus.

Following temperatures of 0° F. in mid-November and down to −12° F. in February the 3 standard varieties, Bing, Lambert and Napoleon, in a variety trial near Prosser, Washington State, showed severe die-back, although the Lambert trees made a relatively good recovery. By contrast, the British Columbian varieties Van and Sam were only slightly affected. Both varieties are good pollinators for the 3 standard varieties and appear to possess commercially desirable tree and fruit characters.—Wash. St. agric. Exp. Stat.

Propagation and rootstocks.

(*See also* 3189e, m, v, 3190f, g.)

3108. Rémy, P.
L'évolution des substances de croissance pendant la germination sur milieu artificiel d'amandes d'abricotier (*Prunus armeniaca* L.) non exposées au froid. **(Changes in growth substances during germination on artificial media of apricot kernels not exposed to cold.)**
Reprinted from *C.R. Acad. Sci. Paris*, 1957, Vol. **244**, pp. 4, bibl. 4.

Apricot seeds were stored at ordinary temperatures for 3–5 months. Acid extracts from these contained a growth-inhibiting substance of R_f 0·65, which reduced coleoptile elongation to 60% of normal. Non-acid extracts contained no growth substances. After 10 days' germination the inhibitor in the fresh acid extract had an R_f 0·45 and 75% growth activity instead of 60%. The fresh non-acid extract showed the presence of a growth-stimulating substance of R_f 0·75 and activity 135%, which was not an indole compound.

3109. Taylor, J. W.
Growth of non-stratified peach embryos.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 148-51, bibl. 7.

When excised peach embryos were exposed to continuous light and high temperatures above 60° F. seedlings obtained from them grew rapidly. The seeds were taken from the fruit and the integuments removed and the embryos were planted in vermiculite with about ⅓ of the cotyledon area exposed. Good germination was obtained without any fungicidal treatment. Seedling growth provided budwood for topworking purposes in the same season as that in which the fruit had been harvested.—Le Grand, Calif.

3110. Rodionov, A. P.
The effect of drying peach seed, after vernalization, on the hardiness of seedlings. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(5): 23-5, bibl. 5, illus.

Peach seedlings, grown from seed which was vernalized during stratification at 0·5–3° C. for 150 days immediately after harvest and then lightly dried under laboratory conditions for 45 days, grew less vigorously but were less frost damaged during their first winter than those grown from seed dry-stored for 45 days and then stratified for 150 days before sowing, or those stratified from harvest until sowing.

3111. Gerlach, J. C.
Air layering of peach trees.
N.Z. J. Agric., 1957, **94**: 604, illus.

Two peach varieties were successfully air-layered by ringbarking a small fruiting branch, applying NAA to the wound and covering with moist soil enclosed in coconut fibres. Golden Queen treated in the spring gave better results than Le Vainqueur treated in the summer.— Rukuhia Soil Res. Stat. J.R.L.

3112. Hartmann, H. T., and Hansen, C. J.
Tree fruit cuttings propagated.
Calif. Agric., 1957, **11**(7): 3-4, 16, illus.

Further experience in the rooting of softwood cuttings of deciduous tree fruits under continuous and intermittent mist is outlined [see *H.A.*, 26: 3341]. Among varieties, mostly rootstocks, that have been successfully rooted with the aid of quick-dip treatment with IFA at 2,000, 4,000 and 6,000 p.p.m. are two peaches, several plums and damsons (*P. domestica*, *P. salicina* and *P. insititia*), several pears (*Pyrus communis* and hybrids) and Virginia crab apple (*Malus sylvestris*). Failures, complete or partial, include *Pyrus calleryana*, the apples Golden Delicious, Northern Spy, M.IX and M.XVI, Texas almond, peach-almond hybrid and Farmingdale pear.—Univ. Calif., Davis.

3113. Rogers, W. S., and Beakbane, A. B.
Stock and scion relations.
Annu. Rev. Plant Physiol., 1957, **8**: 217-36, bibl. 139.

The authors discuss stock/scion interactions, chiefly in pome and stone fruits, with particular reference to the relative importance of root and stem, rootstock and interstock effects on fruiting, stock/scion incompatibility, pest, disease and winter frost resistance, root anchorage and rootstock influence on the rooting of cuttings. Three possible mechanisms of stock/scion interaction are discussed, namely differences in nutrient absorption and metabolism, nutrient transport and auxin metabolism; it is considered that all 3 mechanisms probably work together.—E. Malling Res. Stat.

3114. Delbard, G., and Trioreau, P.
Notes sur les essais mitchouriniens entrepris sur arbres fruitiers depuis 1950–51. **(Notes on Mičurin experiments on fruit trees initiated in 1950/51.)**
Arboric. fruit., 1957, No. 39, pp. 9, 11.

The authors have set themselves the task of determining whether some of the observations of Mičurin can be put to practical use. They have therefore grafted young seedlings of apple and pear on old proved varieties of apple and pear and on known common rootstocks, e.g. EM II, seedlings and other less commonly used stocks. They sum up their conclusions to date as follows: We have been able to note that the rootstocks—EM IX and quince de Provence respectively—have the same effect on seedlings as on the old varieties with regard to quickness in coming into bearing, though there have been exceptions in this respect. The seedlings have varied in their susceptibility to rootstock influence. It is proposed in future to pay particular attention to modifications induced by different rootstocks not only in foliage and wood but especially in fruit colour, shape, date of maturity and taste.

3115. Lotova, L. I.
Anatomical investigations on root formation processes in vegetatively propagated dwarf apple rootstocks. [Russian.]
Doklady Akad. Nauk, S.S.S.R., 1957, **113**: 1369-71, bibl. 7, illus.

Root formation was studied in layered shoots of Paradise types VIII and IX and Doucin type III, and in new dwarf rootstocks obtained by crossing 3 local apple varieties with Paradise VIII and IX (♂), which root less readily. The former were found to possess larger areas of storage tissue in the xylem, effecting more adequate support of meristem development. Furthermore the rate of root development was correlated with the growth of mechanical tissue in the shoot cortex, which, in readily rooting forms, consisted solely of the sclerenchyma of the pericycle, and which developed at the expense of the parenchyma.

3116. Avent, K. L.
Some apple rootstocks and potassium.
J. Aust. Inst. agric. Sci., 1957, **23**: 154-7, bibl. 3.

In a soil known to be K deficient 23 apple rootstock varieties were planted out. The severity of the deficiency symptoms which appeared on the leaves was not related to the amount of root development, but leaf analyses showed that it was closely related to the leaf-K content. Leaf-K differences were due to varietal differences in K absorption efficiency rather than to differences in selective uptake of the antagonistic cations Ca and Mg. A year later, after budding, a K-rich fertilizer dressing corrected the deficiency, but in addition it appeared that the scion varieties worked on the rootstocks had also increased K uptake.—Scoresby hort. Res. Stat., Vict.

J.R.L.

3117. Fisher, D. V., and Weiss, G. M.
Hardy framework experience and rootstock tests with apples in British Columbia.
Proc. Wash. St. hort. Ass., 1956, pp. 54, 56-7.

Canada Baldwin, for many years the recommended interstock for cold areas, has the drawback of being susceptible to crown rot. Haralson shows resistance to crown rot and is hardy, but has a slight dwarfing effect. Other interstocks considered include Charlamoff, Antonovka Yellow Transparent Wealthy, Lobo and large fruited crabapples. Among rootstocks Columbia and Bedford Crabs, *Malus baccata* and seedlings of Antonovka were found very hardy, and EM.IX has shown surprising hardiness when mature.

3118. Karnatz, H.
Das Verhalten der schwedischen Apfelunterlage A 2 in der Baumschule. **(The behaviour of the Swedish apple rootstock A 2 in the nursery.)**
Mitt. ObstVersuchsringes Jork, 1957, **12**: 61-5, bibl. 4.

In the nursery stocks of A 2 were productive and highly resistant to frost, but they were very susceptible to Mg deficiency.

3119. Johansson, E.
Sort- och grundstamförsök med äpple i Blekinge. **(Apple variety and rootstock trials in Blekinge, Sweden.)** [English and Esperanto summaries 1 p. each.]
Medd. Trädgårdsförs. Alnarp **107**, 1957, pp. 11, bibl. 3.

In 10-years' trials at Bräkne-Hoby at a spacing of 4×6 m., varieties worked on A2 gave better yields than those on M.IV. At Ryedal, spacing at 5×5·5 m., 18 named varieries, including some English ones and 2 new clones, were compared on M.I and M.IV. Belle de Boskoop gave the highest yield of 20 kg. per tree per year. The significant difference between varieties is 4·2 kg. There was little difference between yield on the various stocks, but trees on M.IV showed very weak anchorage in the light soil.

3120. Scaramuzzi, F.
Ricerche sull'innesto "a doppio scudo" quale mezzo proposto per superare la disaffinità del pero sul cotogno. **(Investigations on double shield budding as a possible means of overcoming incompatibility of pear on quince.)**
Ann. Sper. agrar., 1957, **11**: 653-76, bibl. 15, illus.

The author using the double shield budding technique recommended by Garner [see *H.A.*, 23: 2548], found it possible to overcome incompatibility of pear on quince in the case of Williams. But, whereas the results with this and certain other varieties tried were always satisfactory, they were not so in Kaiser worked in the same way. It was found possible to overcome incompatibility of Kaiser on quince by a double grafting method. The author suggests that since, from the anatomical point of view, the main difference between the two techniques compared is that, during the first stages of the histogenetic process of the union, in the double-shield budded trees one can observe a temporary direct union of the bark tissues between scion and rootstock, such a possibility of direct union may be the cause of the failure obtained with the double-shield budding of Kaiser on quince.

3121. Johansson, E.
Sort- och grundstamförsök med plommon vid Alnarp 1943–56. **(Variety and rootstock trials with plums at Alnarp.)** [English and Esperanto summaries 2 pp. each.]
Medd. Trädgårdsförs. Alnarp **108**, 1957, pp. 20, bibl. 1.

The results are discussed of 3 trials started in 1942 on a fairly good loam soil with pH of about 6·5. From the 2nd year after planting the following fertilizer was given yearly: 5 kg. sulphate of ammonia or nitrate of lime and ammonia, 2 kg. supers and 3 kg. 40% potash salt per 100 sq. metres. Planting distance was 5×5 m. In one trial trees on their own roots were compared with those on myrobalan. By 1956 most varieties had formed bigger trees on myrobalan. Differences in yield were insignificant. In a 2nd trial Myrobalan B, Common Plum and Pershore were the rootstocks for Kirke and Reine Claude d'Oullins. Common plum dwarfed Reine Claude and Myrobalan made it grow too large. The average yield of both varieties was initially best on Common Plum but by 1956 trees on Myrobalan B had taken the lead. There was no appreciable difference between size of fruits and quality on the different stocks. The 3rd trial was a variety on Myrobalan B. The merits of 20 varieties are discussed.

3122. Friedrich, G., and Hoffmann, P.
Prüfung einer aus dem Hindukusch stammenden Aprikosen-Wildform auf ihre Eignung als Veredlungs-Unterlage. **(Testing a wild apricot from the Hindu Kush mountains for use as a rootstock.)**
Gartenbauwiss., 1956, **21**: 396-406, bibl. 10, illus.

Tests with an apricot, originating from India, have shown that it has a high degree of frost resistance both when unworked and when budded. The vegetative growth of 3 varieties worked on this rootstock was consistently good. No yield data have yet been collected.—Inst. Obst-u. Gemüsebau, Halle-Wittenberg.

3123. Ananthanarayanan, K. K., and Sundararaj, J. S.
Influence of differently aged common peach rootstock on the performance of peach.
South Indian Hort., 1956, **4**: 92-3.

An analysis of data collected over the past 7 years at Coonoor showed that peach trees budded on 8-month-old peach seedling rootstocks were more vigorous and productive than those on 20-month-old or 32-month-old stocks.

3124. (Watts, A. T. J.)
Rootstocks for apricot.
Orchard. N.Z., 1957, **30**(5): 31-2.

Observations in a number of apricot plantations have shown that good trees can be found on apricot, plum or peach stocks and comparatively poor trees on peach and plum. Apricot stock forms a large tree with a good union. Peach stock forms a smaller tree, usually with a good union and producing early maturing fruit. Plum stock, usually myrobalan, forms a tree of intermediate but variable size, often with a poor or incompatible union.—N.Z. Dep. Agric. J.R.L.

Growth phenomena.

(*See also* 3190d.)

3125. Rubin, S. S., and Danilevskaja, O. M.
The measurement of leaf area in fruit trees. [Russian.]
Bot. Žurnal, 1957, **42**: 728-30, bibl. 6, illus.

It has been found that the ratio between the area of a leaf of a given fruit variety and the area of its containing rectangle is practically constant. Coefficients, taken as an average from 100 leaf samples, are given for varieties of apple, pear and cherry, which enable leaf areas to be determined by simple leaf dimension measurements on the plants. Examples are given showing the response of 3- and 4-year-old trees to fertilizer treatments, expressed as leaf area increase determined by the above method.

3126. Gramolin, V. K.
Formation and growth of new roots on apple trees after transplanting. [Russian.]
Sad i Ogorod, 1957, No. 5, pp. 49-51.

Root excavations in the Kuban have shown that the number of roots formed was greater and their growth better on apple trees planted on 16 October, 1952, than on similar trees planted at earlier or later dates in the same autumn or in the following spring.

3127. Sax, K.
The control of vegetative growth and the induction of early fruiting of apple trees.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 68-74, bibl. 9.

Knotting of the stems of apple seedlings *Malus sikkimensis*, *M. fusca* and others was found to check vegetative growth but not accelerate fruit formation. On the other hand knots tied in the stem of a rootstock or interstock did tend to promote early fruiting in a clonal variety worked on it. The inversion of a ring of bark on the trunk or branches of a young apple tree in June was found to induce fruiting the following year. Inserted in late summer it had much less effect.—Arnold Arboretum.

3128. Brown, D. S., and Kotob, R. A.
Growth of flower buds of apricot, peach and pear during the rest period.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 158-64, bibl. 12.

The growth of flower buds was observed on varieties and species known to differ in their chilling needs, namely Royal and Tilton apricots, 8 peach varieties and Bartlett and Winter Nelis pears. In the pears the flower buds of both varieties began rapid growth at about the same time following the accumulation of nearly 1,300 hours of temperature below 45° F. from the 1st Sept. to the 1st March. Since Bartlett is considered to have a higher chilling requirement than Winter Nelis, the abrupt change in rate of flower growth did not serve, therefore, as a criterion of the ending of the rest period in pear buds which can be related to known differences in the chilling requirements of the 2 varieties. But in the peaches and apricots it was possible to relate the growth curves to the winter's chilling and the chilling requirements of the varieties. These results suggest that quantitative measures of bud growth, e.g. dry weight during the growing season, afford a direct means of evaluating the progress of buds through the rest period, and in milder climates, at least, can be used to distinguish varieties with different chilling requirements.

3129. Brown, D. S.
The rest period of apricot flower buds as described by a regression of time of bloom on temperature.
Plant Physiol., 1957, **32**: 75-85, bibl. 4.

Correlation coefficients between flowering date and growth units per day from selected dates to full bloom indicated that on the average the rest influence in the buds gradually deepens after late June, reaches a maximum in late October and early November and declines rapidly thereafter, so that by mid-January buds are quite responsive to growing temperatures. This conclusion was confirmed by another, more critical evaluation which permitted an analysis of the influence of both growing and chilling temperatures on bud development. The curve for hours under 40° F. indicated that chilling in November, December and January was particularly effective in breaking the rest and, thus, in shortening the time to bloom; in addition, chilling during the few weeks in early spring when new buds are forming had a marked effect in advancing the time of bloom in the following spring. A regression analysis which combined the two variables was also made. This permitted an evaluation of the effects of each variable independent of the influence of the other. Estimates were derived from the several regression curves, expressing the relative intensity and efficiency (quality) of each variable's effectiveness in the different seasonal periods in furthering bud development and advancing time of bloom. These expressions are in accord with the known patterns of bud development and with the known relationships between temperatures and the rest period. They constitute a quantitative description of the relation of temperatures to those phenomena. [From author's summary.]—Univ. Calif., Davis.

3130. Yoshimura, F.
Influences of winter temperature on the dormancy of some deciduous fruit trees. I. Studies on bud-opening, shoot development and root growth in young trees of Japanese persimmon, peach and Japanese pear after cold, mild or warm winters. [Japanese, with English summary 1 p.]
J. hort. Ass. Japan, 1957, **25**: 265-73, bibl. 30.

Young trees of peach, pear and persimmon were kept from early December for 37, 57, or 83 days in cold (−1°-0° C.), mild (8°-11° C.) or warm (18°-23° C.) atmospheres and subsequently in a warm room or in the open with minimal temperature exceeding 15° C. Under natural conditions, peach and pear roots began growth in late February and bud burst occurred early in March. The cold treatment retarded root growth beyond bud burst, which was prolific and rapid and showed apical dominance. Both bud burst and root growth were retarded until mid-March by the mild treatment; few buds opened, apical dominance was absent and growth was poor. The warm treatment induced root growth as early as January but retarded shoot growth and very greatly reduced the number of buds opening. Persimmon root growth began after bud burst under natural conditions and in all the treatments. Natural bud burst occurred on 28 February. The warm treatment advanced it by 2 months, and the mild treatment by 12 days, but the cold treatment retarded it by 15 days. In peach and pear cold treatment for 37 days and in persimmon warm treatment for 37 days were sufficient to break dormancy. Bud burst was retarded by cold treatment lasting 37 days in persimmon, 57 days in peach and 83 days in pear.

3131. Toyama, S., and Hayashi, S.
Studies on the fruit development of Japanese pears. I. On flesh cell-division and cell-enlargement and the relation between flesh cell-size and fruit size in some varieties. II. A developmental analysis of the relation between flesh cell-division, cell-enlargement and defoliation. [Japanese, with English summaries ½ p. each.]
J. hort. Ass. Japan, 1957, **25**: 274-8, bibl. 16; 279-82, bibl. 7, illus.

Data are given on the periods during which cell division occurred in fruits of the pear varieties Yakumo (early), Okusankichi (late) and Nijisseiki. In each variety cell size and number both increased with increase in fruit size. In Okusankichi fleshiness depended on intercellular spaces as well as cell enlargement. In Nijisseiki cell division ceased 25–30 days after full bloom, regardless of fruit size. Average cell size at this stage was 40–50μ. Fruit size was reduced by defoliation, the size, rather than the number of cells being below normal. Cell number appeared to depend on the tree's nutrient reserves between autumn and mid-May and cell size on reserves from May to harvesting.

Pollination.

(*See also* 3099.)

3132. Ruffaldi, G. B.
Conseguenze del freddo sulla fruttificazione e sulla frutta del pesco cv. Hâle. (**Effects of cold on fruit production and fruit of the peach variety Hale.**) [English and German summaries, 4 and 5 lines respectively.]
Frutticoltura, 1957, **19**: 271-4, bibl. 2, illus.

Scarcity of insect pollinators in April 1955 resulted in development of very few normal Hale fruits, of extra large size, and some small parthenocarpic fruits of abnormal shape and strong flavour. In the same circumstances certain trees of the Hale type (obviously not true Hale) bore heavy crops of self-fertilized fruit. It is concluded that the true Hale is self-sterile and not commercially parthenocarpic.

Nutrition, soil management and irrigation.

(*See also* 3082, 3152, 3189p.)

3133. Lecrenier, A.
Étude de la nutrition minérale des arbres fruitiers au moyen des isotopes radioactifs. (**Study of mineral nutrition of fruit trees, using radioactive isotopes.**)
Rapp. Comité Appl. Méth. isotop. Rech. agron. 1955–1956, pp. 3-83, bibl. 11, illus.

Solutions containing radioactive Fe, P, Ca and S were applied to intact surfaces of roots, stems, leaves and petioles of young Cox's Orange Pippin apples on M.II and M.IX rootstocks. The greatest amount of nutrients entered via the roots, except in late summer when S entered leaves and petioles more readily than roots. Stems allowed least entry of nutrients. Foliar absorption was greater on lower than on upper surfaces, except that young leaves absorbed more P by the upper than by the lower surface. Petioles absorbed P very efficiently. Foliar absorption was stimulated by light, very strikingly in the case of P and significantly for Ca and S. Translocation of nutrients depended on the organ of entry. In general Ca was the least and S the most mobile of the 4 elements studied. In petiole nutrition P tended to accumulate in the leaves, but otherwise it was readily distributed; in stem nutrition Ca was translocated to the roots. In general the M.IX rootstock was more favourable to translocation than M.II, and in neither was there evidence of the graft impeding nutrient movement. Uptake and movement of Fe depended on the amount of P present and other factors and needs further study.

3134. Liwerant, J.
Influence du mode d'application des engrais sur leur efficacité en culture fruitière. **(The effect of method of application of fertilizers on their efficiency in fruit crops.)**
Plant Analysis and Fertilizer Problems, I.R.H.O., Paris, 1957, pp. 337-50, bibl. 13, illus.

Soil analyses in peach, apple and pear orchards showed that P and K applied to the surface did not penetrate in any quantity to a depth greater than 10–20 cm., and accumulated in excessive quantities on the surface layer. Work on various methods of deep application of fertilizers is reviewed. A subsoil fertilizer distributor is described which has been tested with satisfactory results on plums [see *H.A.*, 26: 2462], apples and pears. The machine has a working capacity of 6–10 ha. per day, the dose applied can be regulated within a range of 200 to 1,200 kg. per ha., and the depth of application can be regulated between 10 and 60 cm. The optimum depth depends on fruit species, rootstock, soil, climate, etc. Use of the machine allows P and K fertilizers to be utilized more efficiently and enables K deficiencies to be rapidly corrected.—Stat. agron. Toulouse.

3135. Jouis, E.
Fumure des pommiers. Verger de Villiers-le-Sec (Calvados). **(Manuring cider apple trees at Villiers-le-Sec, Calvados.)**
Ann. agron., 1956, 7: 1100-2.

A brief account of an experiment in a grass orchard comparing the application of fertilizers by broadcasting, by dry application into 8 holes sunk 25–30 cm. deep beneath the branches of the tree, and by liquid injection with a fertilizer lance. Crops for the 4 years 1950–1953 showed that the first two methods of manuring resulted in a crop nearly double that of the unfertilized controls, and injection by fertilizer lance gave an increase of 66%. The effect on tree growth was not so pronounced.

3136. Depardon, L., and Buron, P.
Pulvérisations de solutions d'engrais sur le feuillage. **(The use of fertilizer sprays on foliage.)**
Ann. agron., 1956, 7: 963, 964.

Three applications of urea, one at 0·36% before flowering and two at 0·6% after flowering, resulted in slightly increased crops of young Passe Crassane pear trees and Reinette Clochard apple trees. Similarly the application to vines of urea and KNO_3 sprays increased cropping, but not sufficiently to make the practice economic.

3137. Hatipov, Š. E̊., and Hatipov, A. Ė.
A trial of foliar nutrition of apple and pear trees. [Russian.]
Sad i Ogorod, 1957, No. 5, pp. 51-2.

One-year-old apple and pear trees top dressed with Chilean nitrate at 500 kg. per ha. in July and August and sprayed during these months with superphosphate at a total rate of 108 kg. per ha. in 1 : 4 aqueous solution were found to be taller and to have thicker stems by October 22 than trees which were only top dressed. A similar treatment of apple seedling rootstocks gave similar results.

3138. Ticknor, R. L., and Tukey, H. B.
Evidence for the entry of mineral nutrients through the bark of fruit trees.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 13-16, bibl. 14.

By the use of radioactive phosphorus it was determined that phosphorus entered through bark of Jefferis apple trees during the growing season. The amount of material which entered increased tenfold if the bark was scraped, thirtyfold if the solution was applied in gauze to intact bark, and a thousandfold if the solution was applied in gauze to scraped bark. [Authors' summary. See also *H.A.*, 23: 211, 212 and 25: 173.]

3139. Ljones, B.
Om nytten av fosforgjødslinga. **(On the value of phosphate applications.)**
Frukt og Baer, 1957, **10**: 45-7.

In a general discussion of the question whether P applications to fruit serve a useful purpose in Norway where soil phosphorus is high, reference is made to an experiment carried out at the Institute of Fruit Growing of the Norwegian College of Agriculture. The data presented show the effect of N applications at 3 rates on the P content of apple leaves grown under 3 methods of soil management. It is clear from the figures that trees under grass receiving little N are not liable to suffer from P deficiency. Some recent figures are also cited on the P content of apple, black currant and raspberry leaves on soils of different P levels.

3140. Lichy, C. T.
The effect of potassium level of soil on the growth and production of apples.
Diss. Abstr., 1956, **16**: 1766-7, being *Publ.* 18,475 of 103 pp.

In studies on several apple varieties the addition of K fertilizer to the soil increased soil K, decreased leaf Mg and after a time lag increased leaf K. Soil fertilization with P increased soil P and Ca but did not affect leaf content of these elements. Correlations of leaf and soil K were significant. Varietal differences in dry leaf weight were observed, Stayman having the highest. Yields were not affected by treatment in the Delicious and Stayman experiments. In sand culture where moisture was limiting, distinct increases occurred in the leaf moisture content as a result of increasing K;

where moisture was plentiful the addition of K caused no increase in leaf moisture content. The reducing sugar and starch content of the leaves was only generally related to K. There was a definite varietal difference in leaf content of nutrients; Rome had the highest leaf N and P, but lowest Ca, while Stayman had the highest leaf Ca but lowest leaf N.—Rutgers Univ.

3141. Proebsting, E. L., Jr., and others.
Relationship between leaf nitrogen and canning quality of Elberta peaches.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 131-40, bibl. 10.
Influence of nitrogen fertilizer on processing quality of Elberta peaches.
Proc. Wash. St. hort. Ass., 1956, pp. 104-6.

Highly significant correlations were found between the quality of canned fruit and nitrogen in the leaves of Elberta peach trees. Quality ranged from astringent, fibrous, soft fruit in the low-nitrogen range to acceptable firmness, good texture and flavour in the high-nitrogen. As regards fruit composition tannin was lowest in high nitrogen fruit. Soluble solids and acidity were lower and ascorbic acid higher in high-nitrogen than in low nitrogen fruit. These results do not entirely agree with previous work which was concerned, however, with fresh market and not canning quality.—Fruit Veg. Prod. Lab. Prosser, Wash.

3142. Hewetson, F. N.
Re-establishing the peach orchard: the influence of various nutrient solutions and fertilizers on the growth and development of one-year peach trees.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 122-5, bibl. 2.

In these trials on young peach trees planted on an old peach site, as on a previous occasion [see *H.A.*, 24: 152] the provision of a readily available source of nitrogen gave the trees a quick early start and they became well established.—Pa St. Univ., University Park.

3143. Mori, H., and Sadamori, S.
Studies on sod culture in apple orchards. I: The competition of tree and red clover for soil moisture and nutrients. [Japanese, with English summary 1 p.]
Reprinted from *Reps Tohoku nat. agric. Exp. Stat.* **4**, 1955, pp. 106-24, bibl. 30, illus.

Observations were made for 3 years in commercial and experimental apple orchards. Soil moisture under red clover sward was adequate and no drought injury was apparent. At the lower soil depths (60–80 cm.) soil moisture content under the sward tended to be slightly lower than under clean cultivation. In pot tests with white clover it was shown that cutting the top also reduced root growth. Soil nitrate in the surface soil was lower early in the season under sward than under clean cultivation, but later differences were less marked. The sub-soil content of nitrate was not affected by soil management until midsummer, after which it decreased under the sward. Soil nitrate content was markedly increased by ploughing-in the sward early in the season. The leaf N content was lower on the sward plots than on the clean cultivated plots in mid-July, but later no marked differences were apparent. Leaf contents of P and K were not affected by soil management.

3144. Botting, G. W.
Establishing sub-clover in apple orchards.
J. Dep. Agric. S. Aust., 1957, **60**: 387-90, illus.

Subterranean clover used as a cover crop in apple orchards caused a marked improvement in tree health, increased cropping and improved soil texture. In trials on different soil types lime had an outstandingly beneficial effect on clover growth. Clover was successfully established on plots sown before or at apple harvest; germination in plots sown after harvest was poor.

3145. Proebsting, E. L., Jr.
Soil management in Elberta peaches.
Proc. Wash. St. hort. Ass., 1956, pp. 92-5.

This is the first report on a long-term experiment established in 1952 to evaluate the response of Elberta peaches to the following systems of soil management: orchard grass and alfalfa each as a permanent cover crop, rye and vetch each as a winter cover crop, orchard grass sod plus heavy mulch, and non-cultivation with keeping the ground bare by herbicidal sprays. Five different rates of N at 0 to 2 lb. N per tree were applied to each system. The most spectacular result to date has been the response of the trees in grass to mulching. In 2 years the yields of this treatment have improved from the lowest to the highest, owing partially to reduced frost damage.

3146. Naumann, W.
Untersuchungen über den Einfluss verschiedener Gemüseunterkulturen, besonders des Spargels, auf Wasser- und Nährstoffversorgung sowie Wuchs- und Ertragsleistung von Schattenmorellen in Junganlagen. **(Studies on the effect of various vegetable intercrops, particularly asparagus, in young sour cherry orchards on water and nutrient supply and on growth and yields.)** [Russian, English and French summaries ½ p. each.]
Kühn-Arch., 1956, **70**: 317-68, bibl. 28, illus.

Young sour cherry trees in 4 locations were intercropped with cucumbers, tomatoes, early potatoes, kohlrabi, carrots, dwarf beans and peas. Their effect on nutrient uptake by the cherry trees was studied by leaf analysis. The cherry leaf N content increased markedly from July with pea crops, but it was decreased with early potatoes and kohl rabi. The K contents were highest in fallow, and lowest with potato or kohlrabi intercrops. All intercrops led to an increased uptake of CaO, especially potatoes and kohl rabi. Trees on mahaleb had a lower K content, and in the beginning of the year a higher Ca content, in the leaves than trees on mazzard. The osmotic value of expressed sap was increased with an intercrop of potatoes, kohlrabi, peas and carrots; the effect of tomatoes, cucumbers and beans was much less, first becoming apparent in August. All intercrops had an unfavourable effect on nutrient and water supply; reductions in growth and yields were about 10–13%. Early crops of potatoes and kohlrabi were particularly harmful, while the effect of late cucumbers, tomatoes and beans was much less unfavourable. Planting on old asparagus soils favoured growth and yield of the trees, especially in dry localities. It is suggested that rooting along the channels made by old asparagus roots allows quicker nutrient uptake. An asparagus intercrop also had a good effect on growth of young trees.—Inst. Obst- u. Gemüseb., Halle.

3147. Zeiger, D. C.
A study of the response of mature Stayman and Rome Beauty apple trees to irrigation and fertilizers.
Diss. Abstr., 1956, **16**: 1771-2, being *Publ.* 18,490 of 223 pp.

Two fertilizer treatments (NPK and NPK plus trace elements) and 3 irrigation regimes were applied to bearing Rome Beauty and Stayman trees. The number of fruits remaining on the trees after June drop was higher on the heavily irrigated than on the non-irrigated plots where trace elements were used, whereas the opposite effect was observed without trace element applications. Trace element application reduced fruit numbers remaining after June drop to a highly significant extent with Stayman trees but not with Rome Beauty. Fruit abscission beginning about 1 August occurred to a similar extent each year, and the effects on pre-harvest drop of fertilizer and irrigation treatments showed a similar trend to that of their effects on June drop. The occurrence of black rot, codling moth and apple maggot in Rome Beauty was significantly related to treatments. Fruit yields of both varieties increased with irrigation where trace elements were used, but were unchanged or slightly decreased where NPK only was applied. Rome Beauty trees fertilized with trace elements were slightly more regular in year-to-year bearing. The percentage of fruits over 3 in. in diameter was increased by heavy irrigation, but not significantly.—Rutgers Univ.

3148. Nour, M.
The effect of different minimum soil moisture levels on potassium and phosphorus uptake by seedling plants of peaches, apples, mustard and strawberries.
Diss. Abstr., 1956, **16**: 2273, being *Publ.* 17,924 of 111 pp.

The effect of minimum moisture levels of 70%, 40% and 10% of field capacity on P and K uptake was studied in a soil with a total exchange capacity of 15 m.e. The growth of all test plants was proportional to the amount of water contained in the soil. P and K increased in the leaf tissue with increasing moisture and with increasing P and K levels. There was a direct interrelationship between P and K uptake. Increasing K to 6% of the exchange capacity caused injury to strawberry plants.—Univ. Missouri.

3149. Feldstein, J., and Childers, N. F.
Effect of irrigation on fruit size and yield of peaches in Pennsylvania.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 126-30, bibl. 12.

An account of successful irrigation experiments with Golden Jubilee, Newday and Elberta peach on well-drained fertile loam soil in Pennsylvania. Yield and size were significantly increased in all varieties. Ripening on irrigated trees was 2 or 3 days earlier and was more uniform allowing all picking to be made on one day.—Rutgers Univ. New Brunswick.

Pruning.

(*See also* 4012.)

3150. Capucci, C., and others.
La potatura verde nelle piante arboree da frutto. (**Summer pruning of fruit trees and vines.**)
Frutticoltura, 1957, **19**: 287-95, illus.

A series of 5 short articles on summer pruning of (1) apple, pear, peach and vine in Italy generally; (2) peach in Emilia and Romagna; (3) peach, almond, vine and olive in southern Italy; (4) peach and vine in Campania; and (5) citrus, olive, almond, pistachio, vine and hazel in Sicily.

3151. Preston, A. P.
Pruning trials with Laxton's Superb apple.
J. hort. Sci., 1957, **32**: 133-41, bibl. 8.

Three forms of winter pruning were applied to open-centre and delayed open-centre trees of Laxton's Superb om M.IV and M.II. Established-spur pruning resulted in more new wood, fewer fruit buds and less marked biennial bearing than the two other systems; fruit size was good. In general the regulated trees cropped much more heavily than the established-spur-pruned trees, with yields from renewal-pruned trees being intermediate. Deblossoming of trees for 6 years resulted in increased tree size and little or no loss of total crop up to the eleventh year from start of deblossoming. After the first crop from deblossomed trees, serious biennial bearing was induced in renewal-pruned and regulated trees but not in established-spur-pruned trees.—E. Malling Res. Stat., Kent.

3152. Schneider, G. W., and McClung, A. C.
Interrelationships of pruning, nitrogen rate and time of nitrogen application in Halehaven peach.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 141-7, bibl. 2.

Increased severity of pruning led to decreased yield and to red colour on fruit and delayed fruit maturity, also to increased fruit weight, terminal growth and per cent foliar nitrogen. Increasing the rate of N applied from 0·3 to 1·2 lb. per tree per year increased terminal growth and per cent foliar N and delayed fruit maturity. It did not measurably affect fruit size and it decreased fruit colour. The actual time of N application did not affect any of the factors measured except for small differences in maturity date and per cent foliar N. When yield was considered there was a significant interaction between pruning and rate of N applied.—N.C. agric. Exp. Stat., Raleigh.

3153. Rothlin, R. E.
Duraznero. Observaciones sobre una colección de estudio. (**Observations on a collection of peach varieties under study.**)
Idia, 1956, Nos. 106/8, p. 274.

In every case production was higher without than with pruning, but branches were broken by the weight of fruit at their ends. Winter spraying with 5% oil gave good control of clover mite (*Bryobia praetiosa*). Aphids (*Myzus persicae*) were controlled by BHC.

Spraying for cultural purposes.

(*See also* 3189s, w, 3190j.)

3154. Southwick, F. W., and Weeks, W. D.
The influence of naphthaleneacetic acid and naphthaleneacetamide during a four-year period on thinning and subsequent flowering of apples.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 28-40, bibl. 12.

Data from trees 15 years or more old indicate that NAAmide is a safer and milder thinning material than NAA. NAA may be necessary on certain varieties subjected to much cross-pollination. Repeat applications of NAAmide, unlike those of NAA, may sometimes reduce the set more than a single application. Both NAA and NAAmide are capable of influencing the biennial habit of some varieties. Results of preliminary trials indicate that the amount of thinning achieved was in neither case closely related to the foliar nitrogen level which generally exists in commercial orchards.—Univ. Mass., Amherst.

3155. Harley, C. P., Moon, H. H., and Regeimbal, L. O.
Effects of the additive Tween 20 and relatively low temperatures on apple thinning by naphthaleneacetic acid sprays.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 21-7, bibl. 7.

Experiments between 1953 and 1956 indicate that, if frost occurs in an apple orchard during bloom or early fruit development, leaf absorption of NAA is increased, hence the concentration of NAA can be reduced. As an additive to NAA thinning spray Tween 20 (polyoxyethylene sorbitan monolaurate) (1) proves to be a bridging solvent between NAA and water, (2) is a standard and stable compound, (3) at 0·125% caused no apparent phytotoxicity, (4) greatly enhanced absorption of NAAC^{14} by apple leaves, (5) is a mild thinning agent in itself. The reasons for the greater absorption through the under surface of leaves than through the upper are discussed.—U.S. Dep. Agric., Beltsville, Md.

3156. Falch, J., and Strauss, E.
Die chemische Fruchtausdünning im Lichte neuester Erkenntnisse. **(Chemical fruit thinning in the light of recent results.)** [English, French and Spanish summaries 4 lines each.]
Mitt. Klosterneuburg, *Ser. B*, 1957, **7**: 153-60, bibl. 4, illus.

Shellestone (based on NAA) was used in apple thinning experiments at 3 concentrations. The treatment was most effective when the diameter of the fruits was about 5–8 mm., and the temperature was 10–15° C. Of 6 apple varieties treated, Cox's Orange, London Pippin and James Grieve were the most sensitive to the chemical, concentrations of 0·15–0·2% giving the best results. Concentrations of 0·3% were more effective with Freiherr von Berlepsch, Ontario and Reinette du Canada, but thinned fruits of Ontario and Reinette du Canada did not store well. Biennial bearing in Freiherr von Berlepsch, London Pippin and Ontario was controlled by the thinning treatment.

3157. Lalatta, F.
Ulteriori indagini sull'alternanza di produzione nel melo. Terzo contributo. **(Further studies on biennial bearing in apples. Part III.)** [English summary 6 lines.]
Ann. Sper. agrar., 1957, **11**: 557-81, bibl. 18, illus.

Chemical thinning with DNOC checked biennial bearing if carried out immediately before the peak of flowering in the variety Durello, and also in Rosa Mantovana when it was practised in conjunction with ringing. In both varieties the treatment increased fruit size to an extent which practically compensated in total yield for reduction in number, improved fruit colour and gave satisfactory flower production the following year. In all these respects ringing alone was ineffective. Drastic hand thinning accompanied by ringing, tested on Rosa Mantovana, substantially reduced yield, but very markedly improved size and colour of fruit and induced abundant flowering the following year. [For previous parts see *H.A.*, 24: 169 and 2288.]

3158. Southwick, F. W., Weeks, W. D., and Lord, W. J.
The effect of several growth regulators on the preharvest drop and softening of apples.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 41-7, bibl. 14.

Trials took place between 1952 and 1955 mainly on McIntosh trees of 20 years of age or more. In 1955 neither 2,4,5-TA nor 2,4,5-TAA effectively controlled pre-harvest drop, whereas NAA and 2,4,5-TP behaved normally in this respect. Possible reasons are discussed but without conclusion. Results in 1952 indicated that when 2,4,5-TA at 20 p.p.m. is effective it is less of a ripener than 2,4,5-TP at 20 p.p.m. and may even retard fruit drop for as long as 2,4,5-TP. On Baldwin in 1954 2,4,5-TP was the only effective material tried for controlling fruit drop. None of the materials hastened the rate of fruit softening in Baldwin.—Univ. Mass., Amherst.

3159. White, D. G.
The use of stop-drop sprays to promote the red color of apples.
Bull. Pa agric. Exp. Stat. **617**, 1957, pp. 17, bibl. 32.

Fruit colour of Delicious, Gravenstein, Red Gravenstein and Lady apples was improved by certain spray treatments to which Rome Beauty and Stayman did not respond. A combination spray of 20 p.p.m. 2,4,5-TP and 2,000 p.p.m. MH-40 induced a desirable bright red colour in Delicious, while treatments including NaSCN caused a less desirable dull colour. Two combination sprays acted on fruit colour indirectly through the leaves, while MH-40 plus NaSCN increased colour by fruit contact only. In commercial orchard trials combination sprays of 2,4,5-TP plus 2,4,5-TA increased colour and hastened maturity of Delicious, Gravenstein and Red Gravenstein fruits, but with the Gravenstein varieties there was some leaf scorch. In further trials with 3 dates of application, a spray of 15 p.p.m. 2,4,5-TP plus 5 p.p.m. 2,4,5-TA gave significant increases in red colour development in Delicious fruits, application 40–50 days before harvest giving the best results. There was complete control of pre-harvest drop with 20 p.p.m. of 2,4,5-TP, while other treatments gave almost complete or moderate control.

3160. Blommaert, K. L. J.
Fruit size increased by growth regulator. Effects on apricots.
Fmg S. Afr., 1957, **33**(3): 34-6, bibl. 2, illus.

In preliminary tests sprays of 2,4,5-T at 50 p.p.m. were applied to Royal apricot trees at the time of pit hardening. At harvesting sprayed fruits showed a 25% increase in weight and 13% increase in diameter in comparison with unsprayed fruits, and ripening was 3 to 4 days earlier. Sprayed fruits showed a considerable amount of cracking, and some leaf abnormalities were induced.—W.P. Fruit Res. Stat., Stellenbosch.

3161. Crane, J. C., and Campbell, R. C.
The comparative effectiveness of girdling and 2,4,5-trichlorophenoxyacetic acid for creasing size and hastening maturity of apricots.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 165-9, bibl. 11.

Experiments in 1955 and 1956 both showed that 2,4,5-T spray application, girdling and a combination of both at the beginning of pit hardening all increased fruit size and hastened maturity with increasing effectiveness in the order listed. The girdling had deleterious effects on vegetative growth and subsequent fruit production. [Authors' summary.]—Univ. Calif., Davis.

3162. Bradley, M. V., and Crane, J. C.
Effects of auxins on development of apricot seeds and seedlings.
Amer. J. Bot., 1957, **44**: 164-75, bibl. 31, illus.

Spraying apricot trees at the beginning of stone hardening with 25, 50 or 100 mg./l. of 2,4-D completely inhibited germination of the seeds, which appeared morphologically normal. The effect of 2,4,5-TP was less marked, and that of either 2,4,5-T or NAA was still slighter. With the phenoxy compounds the seedlings which did develop showed inhibited radicle and epicotyl growth and proliferation (including root development) from other parts. The results were similar when 2,4,5-T was applied directly to the seeds. [See also *H.A.*, 27: 92.]—Univ. Calif., Davis.

3163. White, D. G.
Results from assays of several growth regulators of fruit trees, particularly the peach.
Progr. Rep. Pa agric. Exp. Stat. **165**, 1957, pp. 8, bibl. 40.

Lanolin smears on fresh leaf scars in autumn and aqueous or alcoholic sprays in spring were used to apply 30 different growth substances, singly or in combinations of up to 5, in attempts to retard flowering. Peach flowering in 1952 was delayed a few days by 15 different smear treatments, but these were ineffective the following year. In 1954 it was delayed by 3 alcoholic sprays, but in general results were inconsistent. Fruit set was reduced by 27 lanolin smears and fruits were eliminated without plant injury by 21 smears and 2 alcoholic sprays, triple combinations of growth substances being most successful in this respect. Shoot growth was harmlessly suppressed by 3 alcoholic sprays, which might prove useful on other trees than peach. Petal drop was delayed several days by 2 alcoholic sprays, which might be adaptable for ornamental plants. Peach shoots were killed by 125 smear treatments, possibly adaptable for brush clearance. There was no clear connection between chemical structure of the growth substances and type of response. Frost injury to flowers of apple, plum, peach, or sour and sweet cherries was not counteracted by the sodium salt of 2,2-dichloropropionic acid or by N-meta-tolylphthalamic acid.

Composition of plants.

3164. Emmert, F. H.
A comparison of different leaf samples and the total and soluble tests as indicators of apple tree nitrogen, potassium, and magnesium nutrition.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 1-12, bibl. 26.

One-year-old apple trees in a hydroponic apparatus formed the experimental material in a trial on (1) comparative sensitivity of tip, mid- and base shoot leaves to changes in nutrition, (2) comparative sensitivity of the total and soluble tests to changes in nutrition, and (3) the effect of plant nutrition on relative nutritional status of tip, mid- and base leaves. The results of the study, which are discussed, lend support to the practice in diagnostic work of analysing mid-shoot leaves for total nutrient content.—Storrs, Conn.

3165. Jones, M. B., Fleming, J. W., and Bailey, L. F.
Cyanide as a growth-inhibiting substance in extracts of peach leaves, bark, and flower buds.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 152-7, bibl. 11.

Extracts from buds collected at different times of the year caused inhibition of elongation in pea sections. Different amounts of cyanide were recovered from peach buds, twig bark, leaves and root bark. The inhibition caused by extracts from the first three of these was comparable to that caused by a sodium cyanide solution containing an equal amount of cyanide, and that caused by the extract from peach root bark was greater than that induced by the sodium cyanide solution. Removal of cyanide from the extracts resulted in loss of inhibition induced.—Univ. Ark., Fayetteville.

Composition and physiology of fruits.

3166. L'vov, S. D., and Kalugina, E. V.
Internal factors affecting the keeping capacity of fruits. [Russian.]
Uč. zap. LGU, 1955, No. 186, pp. 3-18, from abstr. in *Ref. Ž.* (*Biol.*), 1957, No. 6, abstr. 22330.

In experiments with 10 autumn and winter varieties of apple a parallelism was found between the keeping quality of the fruits and their sugar content. At the end of the storage period sucrose content was greatly reduced (2–3 times) and reached the same level (0·17–0·57% of fresh weight) in all varieties, while the quantity of monosaccharoses remained almost unchanged or increased. It appears that monosaccharoses, irrespective of quantity, cannot be used for respiration but that sucrose is the sugar mainly used. The activity of the enzyme system accomplishing this change in sucrose content is greatly reduced towards the end of the storage period, and this disturbs the respiration process and reduces the resistance of the fruit to microorganisms. In the pulp of healthy Italian lemons the content of sucrose and other sugars hardly changes during storage. The basic reserve materials for the respiration of lemons appear to be substances in the albedo layer. In lemons affected with the non-infectious disease membranosis, however, the same parallelism between storage capacity and sucrose exists as in apples. The hypothesis is advanced that in fruit affected with membranosis the enzyme systems which act on the pyranose forms of sugars are disturbed. The only respiratory material remaining is sucrose which is soon exhausted during storage.

3167. Džamić, M. D.
Changes in the ratio of total and actual acidity in fruit. [Yugoslav, with English summary 1 p.]
Zborn. Rad. poljopriv. Fak. Belgrade, 1956, **4**(2): 97-110, bibl. 14.

A study was made of the changes in the ratio between the total organic acid concentration and the pH value of 4 apple varieties and crab apples during growth and storage. The decrease in this ratio during growth was greater in the cultivated apples than in the crabs, but the ratio was more affected by environmental conditions in the crabs. The decrease in the ratio was markedly less during storage than during growth. [See also *H.A.*, 27: 177.]

3168. Pastoriza, R., and Córdoba, O. G.
Pérdida de votamina C en dos variedades de manzanas, Deliciosa colorada y Deliciosa común durante su conservación frigorífica. **(Loss of vitamin C in two varieties of apple, Delicious and Red Delicious, during cold storage.)**
Idia, 1956, Nos. 106/8, p. 45.

In the fortnight interval between harvesting and the beginning of storage, Delicious lost 37·1% of its original vitamin C content, and 180 days after harvesting the loss had risen to 42·74%. Corresponding losses from Red Delicious were 21·59% and 39·39%. Initial and final values in mg. per 100 g. of fresh pulp were 2·48 and 1·42 in Delicious and 2·64 and 1·6 in Red Delicious.

3169. Siegelman, H. W., and Hendricks, S. B.
Photocontrol of anthocyanin synthesis in apple hypodermis.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): ix.

Two distinct phases dependent on light are required for anthocyanin formation in apple hypodermis. The first phase is an induction period of about 20 hours; the second is a period of linear formation of anthocyanin at constant radiant energy. The action spectra for these 2 phases are similar if not identical.—U.S.D.A., Beltsville, Md.

3170. (Siegelman, H. W., and Hendricks, S. B.)
How sun makes apples red.
Agric. Res., Wash., 1957, **5**(10): 12.

Early-harvested apples of Jonathan, Rome Beauty and Arkansas were stored at 32° F. and given artificial illumination. The fruits became red most quickly under red light. The light-absorbing pigment is associated with copper, forming the compound copper flavo-protein.

3171. Marks, J. D., and Varner, J. E.
The effect of bruising injury on the metabolism of fruit.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xlv.

Green mature cherries (Royal Anne) were incubated in the presence of $C^{14}O_2$ for 2½ hours. After the excess $C^{14}O_2$ had been flushed out the cherries were bruised and the CO_2 evolved during the next 2 hours recovered as $BaCO_3$. The major fraction of $C^{14}O_2$ taken up was incorporated into the organic acid fraction, chiefly malic acid. After bruising it was found that malate was the only radioactive material which disappeared more rapidly from the bruised fruits than from the controls. The results of these experiments and similar experiments with tomato fruit indicate that the additional CO_2 produced as a result of bruising injury arises from the decarbonization of malate followed by the decarboxylation of pyruvate.—Ohio St. Univ., Columbus.

Harvesting, packing and marketing.

(*See also* 3086-3088, 3089f, 3189a, f, h, k, l, o, z.)

3172. Lamouria, L. H., and others.
Harvester for canning fruit.
Calif. Agric., 1957, **11**(8): 11-12, 14, illus.

Peaches and pears harvested by shaking on to a canvas catching frame suffered more damage than fruit harvested by hand. Tests showed that most of this damage occurred during the passage of the fruit through the tree. In further tests the question of tree structure will therefore receive particular attention.—Univ. Calif., Davis.

3173. Merchant, C. H., and others.
Consumer packages for Maine McIntosh apples.
Bull. Me agric. Exp. Stat. **553**, 1956, pp. 20, bibl. 2, illus.

Three new polythene consumer packages, each holding 3 lb. of apples, and 2 new master containers are described. The packages are a long, narrow bag holding a jumble pack, a bag with a divider insert and a bag with cell partitions. When all 3 packages filled with McIntosh apples were offered in 6 self-service supermarkets at the same price (29 c.) the jumble-pack bags accounted for 40·5% of sales and the other two bags for 29·1 and 30·4%. Apples transported in the packages suffered less bruising than apples transported in tray packs. The two master containers had test strengths of 200 and 275 lb., and packaged apples carried in the stronger container showed slightly the less bruising. Within the master containers the packaged apples in the bottom showed more bruises than apples in the middle or upper layer. Within individual packages the apples in the centre generally showed the most bruises.

3174. Eaves, C. A.
Preliminary report on an experimental shipment of apples to the West Indies in non-refrigerated transport.
A.R. N. Scotia Fruit Grs' Ass. 1956, pp. 75, 77-8.

McIntosh apples were shipped to Barbados and Demerara in unlined boxes and in boxes with polyethylene liners into which N_2 or CO_2 was introduced. The fruit in the lined boxes arrived much harder and greener than that without liners, but showed blossom end spot and internal browning.

3175. Anon.
Cartons for plums.
Amer. Fruit Gr, 1957, **77**(8): 23, illus.

Compared with conventional containers for packing plums, fibrebroad cartons are cheaper, cost less to pack and load, and are easier to handle.

3176. Fernqvist, I.
Transportförsök med körsbär. (**Trials on the transport of cherries.**) [English and Esperanto summaries 1½ pp. each.]
Medd. Trädgårdsförs. Alnarp **103**, 1957, pp. 24, bibl. 6.

Results are set out in considerable detail on the transport of different cherry varieties and on the transport of cherries submitted to different treatments. They varied considerably as between varieties. The wet and cold season in 1954 resulted in fruit cracking. Picking in the morning resulted in better cherries after rail transport for 250–812 miles than picking in the afternoon, but the difference was not significant. Storing for some hours in the cool at 10° C. apparently did not affect quality after transport. No difference was observed in transported cherries as between cherries from manured and unmanured plots. Transport of 3 sour cherry varieties 250 miles made them unmarketable.

Storage.

(*See also* 3189y.)

3177. Eaves, C. A.
Gas storage of apples.
A.R. N. Scotia Fruit Grs' Ass. 1955, pp. 59-62.

The most satisfactory results were obtained when McIntosh and Northern Spy were picked mature and stored in 7% CO_2=14% O_2 at 38° F. For Red Delicious and Red Rome Beauty a 5% CO_2=5% O_2 atmosphere at 32° F. was preferable.

3178. Eaves, C. A.
Development of controlled atmosphere storage in the Annapolis valley.
A.R. N. Scotia Fruit Grs' Ass. 1956, pp. 137, 139-40.

Information is given on the results of gas storage of 40,000 bushels of apples, mainly McIntosh, by some commercial growers in 1955. The construction of storages in existing buildings is outlined; the estimated cost of construction was $1.25–1.50 per bushel.

3179. Meigh, D. F.
Volatile compounds produced by apples. II. Alcohols and esters.
J. Sci. Food Agric., 1957, **8**: 313-26, bibl. 31.

Methods have been developed for analysing the volatile alcohols present in the atmosphere of refrigerated gas stores containing apples. Alcohols and esters produced by three different varieties of apple, two resistant and one susceptible to superficial scald, were analysed. No correlation was found between a severe incidence of scald and a high rate of production of volatile compounds. Apples produced volatile alcohols, aldehydes, ketones and esters at a much greater rate in air than in gas storage. Among the alcohols produced by the apples were considerable quantities of ethanol and D-2-methylbutan-1-ol. [Author's abstract.]—Ditton Lab., D.S.I.R., Maidstone, Kent. [For part I see *H.A.*, 26 : 3400.]

3180. Hall, E. G.
Control of apple scald.
Food Pres. Quart., 1957, **17**: 2-6, bibl. 8, illus.

There is some evidence that lower storage temperatures delay the appearance of scald and maintain better green colour, firmness and flavour. It is therefore recommended that the Granny Smith variety be picked well matured and stored at a temperature of 30° F. The fruit should be wrapped in good-quality oiled paper containing at least 15% of the correct grade of refined mineral oil. If necessary, wrapping in oiled wraps, at least under N.S.W. conditions, can be delayed for up to 6 weeks without seriously affecting the control of scald. The oil content of wraps can decrease significantly during storage from one season to the next. The loss can be minimized by storing the wraps in large packages, well wrapped in waxed paper or polythene sheet, and holding in a cool store. [From author's recommendations.]—C.S.I.R.O., Homebush, N.S.W.

3181. Smock, R. M.
A comparison of treatments for control of the apple scald disease.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 91-100, bibl. 14.

Promising results for the control of scald are recorded from the use of diphenylamine dip treatment at 500–2,000 p.p.m., and of wraps impregnated with a 1,250 p.p.m. solution of diphenylamine. Spray treatments before harvest with diphenylamine or Prorex M oil emulsion were not promising. Dip treatment with Santoquin (6-ethoxy-1,2-dihydro-2,2,4-trimethylquinoline) at higher concentrations gave promising control. Whereas unsealed polythene box liners increased the scald hazard, sealed box liners often decreased scald. The possible reasons for this are discussed.—Cornell Univ.

3182. HARDENBURG, R. E., AND SIEGELMAN, H. W.
Effects of polyethylene box liners on scald, firmness, weight loss, and decay of stored eastern apples.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 75-83, bibl. 10.

Experiments are reported with Rome Beauty, Arkansas, Grimes Golden, Jonathan and Golden Delicious apples. Sealed polythene 150-gauge box liners largely eliminated weight loss, slowed ripening and reduced scald in all varieties. Unsealed liners did not give this result. A combination of sealed film liners and individual oiled wraps gave the best protection against scald. The authors discuss the reasons why variable results follow the use of polythene liners and consider that a standardization of polythene is desirable.—U.S. Dep. Agric., Beltsville, Md.

3183. RYALL, A. L., AND UOTA, M.
Further studies with sealed polyethylene liners for Pajaro valley Yellow Newtown apples.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 84-90, bibl. 2.

Yellow Newtown apples from two orchards at different elevations were stored, with and without sealed polyethylene liners, at 45, 40 and 32° F. After 219 days' storage and six days at room temperature, the fruit stored in sealed film liners at 40° F. had the best dessert quality, and scald, decay and internal browning were satisfactorily controlled. Effects of other temperatures were also noted.—U.S. Dep. Agric. Fresno, Calif.

3184. VAN STUIVENBERG, J. H. M., AND KEUKEN, W.
Groene Delicious en gele bananen. (**Green Delicious and yellow bananas.**)
Fruitteelt, 1957, **47**: 226-7.

It is suggested that the method used for ripening bananas may also be used with apples. A stack of about 150 boxes of green Golden Delicious was packed in a wooden storage chamber and covered with plastic sheeting. The temperature was kept at about 16° C., and relative humidity was high. Satisfactory ripening was obtained after 18 days.

3185. EAVES, C. A.
Plastic can cut the cost of apple storage.
Grower, 1957, **47**: 1529-31, illus.

Stacks of 500 bushel boxes of McIntosh apples were sealed in plastic sheeting and placed in a commercial cold store. Storage conditions under the plastic were as good as those in an 8,000-bushel store lined with plastic or in a conventional 5,000-bushel store lined with galvanized iron. There was less than 1% of fungal rotting and only slight development of core browning; flavour and firmness of the fruit was good. The plastic store has the great advantage that the size of the unit may be varied to suit seasonal requirements. —Canada Dep. Agric., Kentville, N.S.

3186. STOLL, K., AND NYFELER, A.
Polyethylenfolien für die Lagerung von Äpfeln und Birnen. (**Polythene film for storage of apples and pears.**)
Schweiz. Z. Obst- u. Weinb., 1957, **66**: 331-40, bibl. 4, illus.

Storage in polythene bags in low or room temperatures markedly reduced water loss in several varieties, but in some cases damage was caused by high CO_2 contents. Golden Delicious was particularly suited to storage in polythene, being hardly sensitive to high CO_2 concentrations. Pear varieties which responded well were Williams', Bosc's Flaschenbirne and Conference.—Eidg. Versuchsanst., Wädenswil.

3187. HANSEN, E.
Reactions of Anjou pears to carbon dioxide and oxygen content of the storage atmosphere.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 110-15, bibl. 12.

Anjou pears were treated during a storage period of 223 days at 30–31° F. with 1, 2·5, 5, 10, 15, and 20% CO_2 in air atmospheres and similar concentrations of oxygen-nitrogen mixtures. A brown-core disorder developed in certain of the CO_2-treated series, being most severe in atmospheres containing 5% or more carbon dioxide. No brown-core developed in the series in which oxygen was reduced, even at the 1% level. Softening during storage was retarded in atmospheres containing 5% and higher carbon dioxide and 5% and lower oxygen. Best flavor and texture were observed in the low oxygen treatments. No Anjou scald developed on the fruit from the high CO_2 or low O_2 treatments. [Author's summary.]—Ore. St. Coll., Corvallis.

3188. CEPONIS, M. J., AND FRIEDMAN, B. A.
Effect of bruising injury and storage temperature upon decay and discoloration of fresh, Idaho-grown Italian prunes on the New York City market.
Plant Dis. Reptr, 1957, **41**: 491-2.

Examination of samples from shipments of fresh prunes showed that both pulp discoloration and decay were directly affected by the severity of bruising. Both troubles were more marked in fruit held at 70° F. than in fruit held at 35° F.—Market Path Lab., N.Y.

Noted.

3189.

a ANON.
Cherry lug liners.
Amer. Fruit Gr, 1957, **77**(8): 22.
Polythene liners reduce decay in transit and storage and keep the fruit fresh longer.

b ANON.
Pear canning waste.
Agric. Res. Wash., 1957, **5**(10): 15.
For livestock feed or ensiling.

c BARGIONI, G.
Attività e programmi dell'Istituto Sperimentale du Frutticoltura di Verona. (**Activities and work programme at the Experimental Institute of Fruitgrowing, Verona.**)
Riv. Ortoflorofruttic. ital., 1957, **41**: 203-10, bibl. 1, illus.
Peach, pear, apple and cherry varieties in the Institute's collections are listed.

d Blair, D. S., Spangelo, L. P. S., and Beingessner, H. F.
Trends in apple breeding.
A.R. N. Scotia Fruit Grs' Ass. 1956, pp. 15-17, 19, 21-4.
Apple production figures for Canada and varietal distribution by Provinces, requirements of new varieties and details of recent introductions.

e Brase, K. D.
Rootstock problems in propagating dwarf pear trees.
Nat. hort. Mag., 1957, **36**: 220-4, bibl. 3, illus.
Advice on double-working and the use of Old Home as a blight-resistant framebuilder.

f Burrows, L. F.
The marketing of apples.
A.R. pomol. Fruit Growing Soc. Que., 1956, pp. 66-73.
Production, disposition, storage, legislation, and organization for marketing in Canada.

g Cittadini, J. C.
Variedades de manzanos y otros frutales que se destacan por su alta producción. **(Apple and other fruit varieties outstanding for high yield.)**
Idia, 1956, Nos. 106/8, pp. 270-1.
High-yielding apple, pear, cherry and plum varieties for the Patagonian region of Argentina.

h Conway, T.
Developments in mechanical and bulk handling of fruit.
N.Z. J. Agric., 1957, **94**: 534-42, bibl. 3, illus., and *Orchard N.Z.*, 1957, **30**(5): 16-19, 21, bibl. 3, illus.
Equipment for 3 systems of bulk handling for apples and pears.

i Duggan, J.
Cider apple growing today.
N.A.A.S. Quart. Rev., 1957, No. 36, pp. 58-62.
Varieties [see also *H.A.*, 27: 2096], cultivation and a note on perry pears.

j Fogle, H. W., and others.
Freestone peach varieties for the Pacific Northwest.
Proc. Wash. St. hort. Ass., 1956, pp. 88-90.

k Hawthorne, P. L.
Consumer packages for tree-ripe peaches.
Amer. Fruit Gr, 1957, **77**(8): 10, 20, illus.
Types of tray cartons compared.

l Haylock, J. H.
The Caribbean area as a market for Nova Scotia apples.
A.R. N. Scotia Fruit Grs' Ass. 1956, pp. 70-2.

m Howlett, F. S.
Malling apple stocks in Ohio.
Fruit Var. hort. Dig., 1957, **11**: 43-4.
Malling VII appears most desirable for commercial plantings.

n Lantz, H. L.
New fruit varieties in Iowa.
Fruit Var. hort. Dig., 1957, **11**: 61-2.
Including notes on the apple varieties Joan, Jonadel, Secor and Sharon.

o (Levin, J. H., and Gaston, H. P.)
Michigan tries bulk box.
Agric. Res. Wash., 1957, **5**(10): 15.
Costs of apple handling reduced by using 20- to 25-bushel bulk boxes.

p Liwerant, J.
Redressement rapide d'une carence potassique du prunier d'Ente par application profonde des engrais. **(Subsoiling to redress K deficiency in young d'Ente plum trees.)**
Ann. agron., 1956, **7**: 1096-7.
Quick results achieved (see *H.A.*, 26: 2462).

q Longley, R. P.
Peaches.
A.R. N. Scotia Fruit Grs' Ass. 1955, pp. 143, 145, 147, 149.
Notes on culture in Nova Scotia.

r Longley, R. P.
Apple varieties.
A.R. N. Scotia Fruit Grs' Ass. 1956, pp. 25, 27-30.
In Nova Scotia.

s Luckwill, L. C.
The chemical thinning of apples in Britain.
Agric. Rev. Lond., 1957, **3**(4): 19-22.
Principles and practice reviewed.

t Mann, A. J., and Keane, F. W. L.
The Weatherspoon plum in British Columbia.
Fruit Var. hort. Dig., 1957, **11**: 38.
Not a type of Italian prune, as previously considered.

u Margolin, A. F.
The culture of dwarf pears. [Russian.]
Priroda, 1957, **46**(5): 107-8.
Types and compatibility of quince rootstocks, and the use of *Amelanchier*.

v Ministry of Agriculture, London.
Rootstocks for apples and pears.
Adv. Leafl. Minist. Agric. Lond. **335**, revised 1957, pp. 4.

w Mitchell, A. E.
Thinning sprays.
Amer. Fruit Gr, 1957, **77**(4): 22, 34, illus.
Growers' experiences with apples and peaches in Michigan.

x Neubert, A. M., Carter, G. H., and Ingalsbe, D. W.
Commercial juice apples of the Pacific Northwest.
Food Technol., 1956, **10**: 396-9, reprinted in *Proc. Wash. St. hort. Ass., 1956*, pp. 67-70, bibl. 1.

y PHILLIPS, W. R.
Handling apples in storage.
A.R. pomol. Fruit Growing Soc. Que., 1956, pp. 57-61.

z RASMUSSEN, M. P.
Prepackaging apples.
Amer. Fruit Gr, 1957, **77**(8): 9, 18-19, illus.
Types of consumer pack and costs.

3190.

a REESE, R. B.
Survey of fruit and tree nut use by frozen dessert manufacturers.
Mktg Res. Rep. U.S. Dep. Agric. **146**, 1956, pp. 32.
Data on the amount and value of particular fruits and nuts used as frozen dessert or in ice cream in the U.S.A.

b ROBY, F., WELKERLING, E. M. L., AND WOUTERS, O. D.
Estudios sobre cualidades agrícolas y comerciales en variedades de durazneros. **(Studies on horticultural and commercial qualities in peach varieties.)**
Idia, 1956, Nos. 106/8, p. 88.
Peach varieties grown in Argentina are classified according to flesh colour and time of ripening.

c SADAMORI, S., AND OTHERS.
New apple hybrids. [Japanese, with English summary ½ p.]
Reprinted from *Reps Tohoku nat. agric. Exp. Stat.* **4**, 1955, pp. 125-8.
Characters of 6 selected hybrids.

d SAPOŽKOV, I. A.
Annual fruiting of apples. [Russian.]
Priroda, 1957, **46**(4): 91-2, illus.
Achieved by thinning out branches without leader pruning.

e SERINI, G.
Correlazione tra tenore in 2-3-butilenglicole ed in acetilmetilcarbinolo e stato di maturazione dei prodotti frutticoli. Nota III. *Cucumis melo*, *Cucurbita citrullus*, *Vitis vinifera*, *Diospyros kaki*, *Fragaria vesca*, *Eriobotrya japonica*, *Ficus carica*, *Armeniaca vulgaris*, *Prunus domestica*, *P. avium* e *P. cerasus*. **(Correlation of 2-3-butyleneglycol and acetylmethylcarbinol contents with the degree of ripening in fruits. III. Melon, watermelon, grape, persimmon, strawberry, loquat, fig, apricot, plum, and sweet and sour cherries.)** [English summary 9 lines.]
Ann. Sper. agrar., 1957, **11**: 583-9, bibl. 16.
Only in melon and persimmon were direct correlations found. [For earlier facts see *H.A.*, 26: 260b, 3391.]

f SOUTY, J.
Il controllo del materiale di moltiplicazione in frutticoltura ed il miglioramento della produzione dei vivai sul piano internazionale. **(Control of propagating material in fruit growing and improvement of production in nurseries on an international scale.)** [French summary ⅓ p.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 116-29.

g THIELE, I.
Progressive Frostversuche mit keimenden und einjährigen Kernobstsämlingen. **(Frost studies with germinating and one-year-old pome fruit seedlings.)**
Züchter, 1957, **27**: 161-72, bibl. 14, illus.
A shortened version of *H.A.*, 27: 1094.

h U.S. DEPARTMENT OF AGRICULTURE.
Fruits, noncitrus, by States, 1949-55, [with] revised estimates, United States, 1934-55.
Statist. Bull. U.S.D.A. **192**, 1956, pp. 88.

i VERNER, L.
New methods in training young Delicious apple trees.
Proc. Wash. St. hort. Ass., 1956, pp. 52-3.
To obtain wider crotches in framework branches [see *H.A.*, 25: 2485].

j WESTWOOD, M. N.
Chemical thinning of peaches and apricots.
Proc. Wash. St. hort. Ass., 1956, pp. 100-2.
Mainly with DNOC preparations during flowering.

k WOUTERS, O. D.
Estudios sobre cualidades agrícolas y comerciales en variedades de ciruelos. **(Studies on horticultural and commercial qualities in plum varieties.)**
Idia, 1956, Nos. 106/8, p. 88.
Five plum varieties proved self-fertile and 9 self-sterile.

l ZIELINSKI, Q. B.
A survey of new early-coloring red sports of Delicious apples.
Fruit Var. hort. Dig., 1957, **11**: 39-42.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 3079, 3089x, 3100, 3101, 3139, 3240e, h, i, k, m, q, r, u, 3742, 4001, 4019.)

3191. SHAULIS, N.
The sampling of small fruits for composition and nutritional studies.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 576-86, bibl. 28.
The author discusses problems of sampling revealed by studies, described in the literature, on grapes and other small fruits. He sums up as follows: "The objective in sampling small fruits is merely to record plant response. The use of simple random sampling to obtain information concerning small fruit composition or nutrition can obscure real differences or point to differences that are not real. The subdivision of the population into classes, as in stratified random sampling, can frequently

be made with little additional cost and tremendous gain in information. Sampling should be based on a familiarity with the plant in order to arrive at a meaningful measure of its responses. With such a base, the available statistical procedures can be used to define the data.—N.Y. agric. Exp. Stat., Geneva.

3192. Scott, D. H., Darrow, G. M., and Ink, D. P.
Merton Thornless as a parent in breeding thornless blackberries.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 268-77, bibl. 11.

Merton Thornless is often killed to the ground by winter cold in the Eastern States. It was therefore used as a parent in crosses with Brainerd and Eldorado to reproduce a hardier type. Of the 1,397 thornless field grown seedlings out of the total population of 31,366 seedlings derived from these crosses, 37 have been selected for use either in further breeding work or as possible commercial varieties. Of these 23 have been rated as winter hardy at Beltsville, Md. Three of these seem to be sufficiently hardy, vigorous, productive and acceptable in fruit characters to warrant testing for possible introduction as commercial varieties.—U.S. Dep. Agric., Beltsville, Md.

3193. Hindle, R., Jr., Shutak, V. G., and Christopher, E. P.
Growth studies of the highbush blueberry fruit.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 282-7, bibl. 2.

A 3-phase cumulative growth curve was determined: stage 1 a period of rapid growth, stage 2 a period of small increase in fruit size and stage 3 a second period of rapid growth which continues up to fruit drop. The time between flower drop and fruit maturity was too variable to be used for predicting time of harvest. Shaded berries took rather longer to ripen than unshaded.—Univ. Rhode Island, Kingston.

3194. Eggert, F. P.
Shoot emergence and flowering habit in the lowbush blueberry (*Vaccinium angustifolium.*)
Proc. Amer. Soc. hort. Sci., 1957, **69**: 288-92, bibl. 3.

After being burned and under normal field conditions new shoots of the lowbush blueberry plant emerged over a period of about 4 weeks. The highest rate of emergence occurred between 3 and 7 days after the first shoots were observed. The later the date of emergence the fewer were the average number of flower buds per shoot and the fewer the average number of flowers per shoot. There appeared to be little or no relationship between the date of emergence and the average number of flowers per bud. There was an average of about 5 flowers per bud on any emergence date in both of the clones. On any one emergence date, vegetative shoots were shorter than flowering shoots. Late emerging flowering shoots, however, were shorter than the earliest emerging vegetative shoots. [Author's summary.]—Me agric. Exp. Stat., Orono.

3195. Ervi, L. O.
Karpalolajien morfologiasta ja viljelymahdollisuuksista suomessa. Perustana kenttäkokeet rahkasuolla köyliössä vuosina 1946–1956. **(On the morphology of certain species of cranberries and the possibility of cultivating them in Finland. Based on field experiments on a sphagnum bog in Köyliö during the period 1946-1956.)** [English summary 4 pp.]
Acta agral. fenn. **92**, 1956, pp. 148, bibl. 96, illus.

A detailed account of field experiments on a sphagnum bog in Köyliö during the period 1946–56 with different strains of cranberry, viz. *Vaccinium macrocarpon* from N. Jersey and native Finnish species *V. oxycoccos* and *V. microcarpum*. Details are given [also in the summary] of the growth characteristics of these three sorts. Thus it was found that the summation of daily mean temperatures from the beginning of May to the middle of blossoming at Huittinen was: *V. microcarpum* 516±16° C., *V. oxycoccos* 622±22° C. and *V. macrocarpon* 1,134±22° C. Comparison is made of berry characters, cropping, leaf shape and size, etc. *V. macrocarpon* in consequence of its late blossoming seemed unlikely to be successful in Finland.

3196. Francis, F. J.
Color and pigment measurement in fresh cranberries.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 296-301, bibl. 5.

Total pigment was measured by blending the berries with a mixture of 1 part 0·1 N HCl and 4 parts 95% ethanol. After decanting and diluting, the absorption was measured at 535 mu. and expressed as mg. Congo Red per gram of barries. The surface colour was measured with the help of a Hunter Colour and Colour Difference Meter.—Univ. Mass., Amherst.

3197. Harding, P. R., Jr.
Preliminary tests of ammonia pellets for control of fungal decay of packaged cranberries.
Plant Dis. Reptr, 1957, **41**: 564-6, bibl. 2, illus.

Ammonia pellets were included in polythene packages of cranberries inoculated with *Penicillium funiculosum*, which were then stored for 12 days at 75° F. and r.h. 62%. The moisture conditions were satisfactory for ammonia release only in non-perforated plastic packages. When sufficient ammonia was released to give some protection against fungal decay, considerable ammonia-injury was caused to the cranberries. Ammonia-pellet treatment is therefore considered unsatisfactory as a means of preventing decay.—Agric. Mktg Serv., Pomona, Calif.

3198. Rake, B. A.
The development of adventitious roots on hardwood cuttings of gooseberries.
J. hort. Sci., 1957, **32**: 195-8, bibl. 11, illus.

The development of roots in hardwood cuttings of the gooseberry variety Keepsake was investigated by lifting samples of cuttings at intervals throughout the time of root formation. Roots occurred at points opposite the bud gaps on the stem and also just above the cutting base. The formation of either type of root was not dependent on callus production at the basal wound, but root development of both types was usually stronger on cuttings which and formed basal callus. No pre-formed root initials were found in unplanted stems. Basal roots arose from areas of parenchymatous cells occurring near the cambium opposite a wood ray. Nodal roots arose from areas or parenchymatous cells near the cambium in the bud gap opposite an area of closely-packed medullary ray cells which were filled with starch grains. [Author's summary.]—Long Ashton Res Stat., Bristol. [See also *H.A.*, 25: 218; 26: 266 and 3424.]

3199. Johansson, E.
Gödslingsförsök med krusbärsbuskar vid Alnarp 1947–1956. **(Gooseberry manurial trials.)** [English and Esperanto summaries 1 p. each.]
Medd. Trädgårdsförs. Alnarp, **104**, 1957, pp. 14, bibl. 3.

The period of trial was 1947–1956, the varieties Achilles and Whitesmith, the pH of the soil 6·3 in the surface soil and 6·5 in the layer 25–50 cm. deep. Spacing was at 2·6×3 m. Treatments given were no manure, farmyard manure, complete artificials, complete artificials less N, P or K and artificials containing only N or only K. Growth, yield and size of berries were all increased by K application. There was no significant difference in yield as between FYM and complete artificials, nor did P appear to have any significant effect. Berry quality was slightly inferior on bushes showing K deficiency. As a result the following recommendation is made for the application of fertilizers to gooseberries on soil not too poor in organic matter, per 100 sq. m. per year: 4 kg. sulphate of ammonia or similar, 1–2 kg. supers, 3 kg. of 50% K_2SO_4 or possibly KCl [or 356, 89–178 and 267 lb. per acre respectively].

3200. Wood, C. A., and Robertson, M.
Observations on the fruiting habit of the red raspberry (*Rubus idaeus*) L.) and on an occurrence of cane "die back" in Scotland.
J. hort. Sci., 1957, **32**: 172-83, bibl. 12, illus.

In flower initiation studies with raspberries it was found that 3 distinct types of bud were formed at each cane node, namely primary, secondary and tertiary, and in all types inflorescence primordia were found from late September onwards. Fruiting laterials were produced by all types of bud although most were produced by primary buds, and there were marked varietal differences in the production of laterals from secondary and tertiary buds. Artificial shortening of the primary laterals in spring induced increased production of secondary and tertiary laterals in Lloyd George, while Malling Promise regenerated mainly with tertiary laterals; Norfolk Giant produced mainly secondary laterals, whereas Malling Jewel showed hardly any regeneration and had the greatest reduction in crop yield. Cane die-back in Malling Promise was probably caused by severe frost damage; the problem of winter injury is discussed.—Scot. hort. Res. Stat., Dundee.

3201. Scott, D. H., and Ink, D. P.
Treatment of *Rubus* seeds prior to after-ripening to improve germination.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 261-7, bibl. 12.

Germination of seeds of black and red raspberries and of blackberries was improved by soaking them in a 1% sodium hypochlorite solution for 1 to 2 weeks, or scarifying with concentrated H_2SO_4. Holding moist seeds in the greenhouse at 70 to 75° F. for 7 to 8 weeks before subjecting them to after-ripening at 36° F. for 3 to 5 months improved germination in some seeds.—U.S. Dep. Agric. Beltsville, Md.

3202. Brauer, A., and Schmitt, L.
Über den Einfluss der Stickstoffdüngung auf Ertrag, Güte und Konservierfähigkeit verschiedener Früchte. **(The effect of nitrogen manuring on yield, quality and preserving qualities of various fruits.)** [English and French summaries ½ p. each.]
Landw. Forsch., 1957, **10**: 124-33, bibl. 2.

Two levels of N applied as nitro-chalk or calcium cyanamide were applied to rhubarb, red currants, gooseberries and tomatoes. Rhubarb showed a marked response to N manuring, the highest yield (from the high nitro-chalk level) being more than double that of the unfertilized control plot. Rhubarb fertilized with cyanamide showed better bottling qualities than that fertilized with nitro-chalk. Red currants also showed a marked response to N from their 4th year onwards. Yields were increased by 12 and 21% at the lower N levels, and by 23% at higher levels. The preserving qualities of red currants manured with nitro-chalk or low calcium cyanamide were good, but were only fair after high cyanamide treatment. In one year's trial no effect of N manuring was observed with gooseberries. Yield increases in tomatoes due to N manuring were only slight. Cyanamide slightly reduced the preserving qualities of tomatoes.—Landw. Versuchsanst., Darmstadt.

3203. Edinburgh School of Agriculture.
A strawberry variety trial.
Rural advis. Leafl. Edin. E. Scot. Coll. Agric. 37, [1957?], pp. 5.

Six Cambridge strawberry varieties were compared with the standard varieties Auchincruive Climax and Royal Sovereign. Cambridge Sentry and Cambridge Rival gave by far the highest yields, followed by Cambridge Vigour. Cambridge Rival had the best flavour but too dark a colour. Cambridge Prizewinner was the earliest variety and Cambridge Rearguard the latest; both had poor flavour and relatively low yields.

3204. Janick, J., and Williams, E. B.
Performance of strawberry varieties and selections in Indiana.
Fruit Var. hort. Dig., 1957, **11**: 51-2.

In a trial of 22 substantially virus-free strawberry varieties at Lafayette, with Howard 17 (Premier) and Robinson as standards, Earlidawn showed particular promise as an early strawberry and Pocahontas was outstanding as a midseason variety. Dixieland and Surecrop were also promising for midseason and Armore was the best late strawberry.—Purdue Univ.

3205. Arney, S. E.
Studies of growth and development of the genus *Fragaria*. IX. An investigation of floral initiation under natural conditions.
Phyton, 1956, **7**: 89-102, bibl. 17.

The date of floral initiation in strawberries can be calculated without dissection fron the dates of emergence of the leaves, and this method has been used to determine the mean date of floral initiation over several seasons in M.48 Royal Sovereign strawberries growing under natural conditions in various parts of the British Isles. The factor primarily responsible for floral induction is the natural shortening of the photoperiod in early September to about 15 hours, and night temperatures only play a secondary role. At higher latitudes initiation occurs later despite lower night temperatures, an effect which may be due to lower day temperatures. Floral initiation may also be delayed for up to 12 days by heavy applications of N fertilizers in July and August. In plants growing in the open floral initiation can be postponed until late October by providing supplementary light to give 18-hr photoperiods or by irradiation with red light during the hours of daylight. In either case floral initiation eventually occurs when night temperatures fall below 45° F. —University Coll., Cardiff. [For part VIII see *H.A.*, 26: 3428.]

3206. Sironval, C.
La photopériode et la sexualisation du fraisier des quatre-saisons à fruits rouges. **(Photoperiod and the reproductive stage of red-fruited perpetual strawberries.)**
C.R. Rech. I.R.S.I.A. **18**, 1957, pp. 229, bibl. 210, illus.

Three physiological phases have been observed during the development of perpetual-fruiting strawberry plants. The first, the vegetative, is from the seed until the development of the 15–17th leaf; daylength and temperature have little effect on this phase. Secondly there is a transitional photophase during which plants are very sensitive to daylength. This period continues until flowering, when the plant enters the reproductive stage; during this phase there is still some response to daylength and temperature. Leaf contents of chlorophyll varied according to stage of development and also with environmental conditions. It is suggested that chlorophyll is being continually metabolized in the leaf, variations in content being particularly marked during the photophase. The pigment contents show a progressive increase under long day conditions up to the end of the vegetative stage. With the onset of the reproductive phase the content of chlorophyll *b* is reduced, and pigments accumulate, especially in adult leaves. Abnormal temperature conditions, for instance a constant temperature of 20° C., also affect chlorophyll metabolism. In tests with young plants an extract of insaponifiable oil from the leaves appeared to stimulate flowering. One of the constituents of the extract, vitamin E, was shown to stimulate flowering at low levels and to be inhibitory at high levels. It is concluded that the photoperiod affects the onset of the sexual stage by regulating chlorophyll metabolism and the availability of vitamin E and possibly of other flower-inducing products.—Univ. Liége.

3207. Kinsman, G. B.
Strawberry culture.
A.R. N. Scotia Fruit Grs' Ass. 1956, pp. 85, 87-9.

Brief general comments are made on improvement in planting stock, cold storage of plants, manuring, soil insecticides, blossom removal, weed control, irrigation, spacing and mulching.

3208. Tomkins, J. P.
Bigger, better berries by the hill system.
Amer. Fruit Gr, 1957, **77**(5): 9, 22, illus.

A 2-row hill system of strawberry planting, with a 12×18×30 in. spacing, has been developed in growers' trials in New York State. Yields from 6 varieties grown thus were much higher than in the matted row system. Lack of an efficient method of runner removal is the main obstacle to the commercial use of this system.

3209. Proebsting, E. L.
The effect of soil temperature on the mineral nutrition of the strawberry.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 278-81, bibl. 1, illus.

Shasta and Lassen strawberries were grown with their roots in 6 different temperatures from 45 to 90° F. The best growth, as measured by dry weight, was obtained at 75° F. Fruiting occurred only at temperatures up to 55° F. Runner production was greatest at 75° F. Variation in root temperature hardly affected the percentage of N in the main tissues. K in the roots fell off sharply with increasing temperature. P tended to be highest at 65° F.—Univ. Calif., Davis.

3210. Proebsting, E. L., and Benson, L. C.
Strawberry fertilizer trial.
Calif. Agric., 1957, **11**(5): 4, 15.

Apricots growing in a clay soil were grubbed because of severe K-deficiency symptoms and replaced by strawberries. In a fertilizer trial, duplicated in 2 parts of the area, the strawberries received 100 lb. N with and without 200 lb. K and 200 lb. P. Neither K nor P had any effect on yield, nor did leaf analysis reveal that any of the added K or P was absorbed. Leaf analyses showed that N declined markedly from the spring to July but rose again towards the end of the season. Ca tended to rise throughout the year and Mn rose at the end of the season. P, K and Mg showed only minor variations throughout the growing period.—Univ. Calif., Davis and Berkeley.

3211. Iowa State College.
Your experiment station reports. Berry yields increased with runner inhibitors.
Ia Fm Sci., 1957, **11**(9): 21-2, illus.

MH-40 at 1,000 and 2,000 p.p.m., sprayed during the summer on matted rows of Blakemore, greatly inhibited runner production. In the following spring early yields were increased by 32% and berry size by 12%. Hand pruning or runners had a similar effect. MH should not be applied during fruit bud formation, and should not be used on everbearing strawberries.

3212. JORDAN, C., AND V. SENGBUSCH, R.
Veränderungen des Zuckergehaltes von Erdbeeren und Früchten anderer Beerenobstarten nach Lagerung bei tiefen Temperaturen. (**Changes in sugar content of strawberries and other berry fruits after low temperature storage.**)
Züchter, 1957, **27**: 186-7, bibl. 2, illus.

Strawberry fruits frozen for about 8 days showed no change in sugar or acid content after thawing. Saccharose had almost completely disappeared from strawberries after freezing at −15° to −20° C. for 1 year. Similar effects were observed with raspberry and other sugar-containing fruits. No change in saccharose content was apparent in peas frozen for a year and more—Max-Planck-Inst. Züchtungsforsch., Hamburg.

Vines.

(*See also* 3100, 3101, 3240a-d, f, g, j, n, p, w, x, 4027.)

3213. VEGA, J., AND OTHERS.
Vid. (**Vines [in Argentina].**)
Idia, 1956, Nos. 106/8, pp. 89-91.

Results of varietal trials are summarized. In manurial experiments there was marked response only to P and a slight increase in sugar content of grapes due to K. In Argentinian rootstocks nutritional demands were higher in spring and lower in autumn than those of European varieties. Among the latter, nutritional requirements were high in Malbeck and low in Dattier de Beyrouth. Attempts to root cuttings of *Vitis berlandieri* led to the conclusion that neither cultural nor artificial means could overcome the congenital lack of rooting capacity in this type. The weakening effects of intensive summer pruning of vines was confirmed.

3214. KASZA, D. S.
Selection of grape varieties.
N.Z. J. Agric., 1957, **94**: 251-6, bibl. 7.

A review of recent work at Te Kauwhata Horticultural Research Station, where the following varieties were selected as suitable for New Zealand conditions: Riesling Sylvaner and Pinot Chardonnay as white-wine grapes, Golden Chasselas and Palomino as white dual purpose grapes, Pinot Meunier and Cabernet Sauvignon as red-wine grapes and Albany Surprise, Pirovano 15, Pearl of Csaba and Iona as table grapes.

3215. GEISLER, G.
Die Bedeutung des Wurzelsystems für die Züchtung dürreresistenter Rebenunterlagssorten. (**The significance of the root system in the breeding of drought resistant vine rootstocks.**)
Vitis, 1957, **1**: 14-31, bibl. 29, illus.

(1) The progeny of interspecific vine crosses showed a wide range of variation with regard to their root system. Two extreme types were found to exist: an extensive one with a small amount of roots growing through a large volume of soil and an intensive one with short roots growing in a small volume of soil. (2) The extensive type had a better capacity for absorbing water under drought conditions than the intensive type. In pot culture this specific capacity may not be apparent and varieties known to be drought resistant in the field may fail. (3) The extreme root types were the result of new combinations, most of which occurred in the progeny of interspecific crosses with the *Vinifera* variety Riesling as one parent. (4) A correlation existed between the drought resistance of a plant and the capacity of its cuttings to root, good rooting being associated with drought resistance. This correlation, however, was not encountered in all combinations. The incidence of seedlings whose cuttings had a good rooting capacity was highest in the progeny of crosses with *Vinifera* varieties. [Translation of author's summary.]—BundesforschAnst. Rebenzücht. Geilweilerhof.

3216. SARASOLA, J. A.
Fuentes de restesincia a *Plasmopara viticola.* (**Sources of resistance to (*Plasmopara viticola.*)**
Idia, 1956, Nos. 106/8, p. 32.

Preliminary breeding trials have produced vines resistant to Argentine forms of downy mildew by crossing local varieties of *Vitis vinifera* with American species. Intensive selection has also shown that a small proportion of the local vines will produce resistant strains.

3217. CELESTRE, M. R.
Una inaspettata qualità dell'uva Italia. (**An unexpected feature of the Italia grape variety.**)
Frutticoltura, 1957, **19**: 284-6, illus.

This important table variety can be kept in excellent condition by 'dry stalk' storage, viz. in a fruit store on matting or suspended from hooks, from harvesting until the following January.

3218. PASTENA, B.
L'asimmetria fogliare nella vite. (**Asymmetry of vine leaves.**)
Ital. agric., 1957, **94**: 457-64, bibl. 16, illus.

Asymmetry of leaves was closely correlated with dorsiventrality of vine shoots and was very little influenced by one-sided illumination of the shoot apex or by development of the axillary buds into side shoots. The more rapid the growth, the higher was the proportion of asymmetrical leaves.

3219. ALLEY, C. J.
Mechanized grape grafting.
Calif. Agric., 1957, **11**(6): 3, 12, illus.

An illustrated description is given of a portable machine which cuts tongues and grooves for bench grafting vine scions and rootstock cuttings. Where the wood used exceeds ½ in. in diameter tying is unnecessary. Three reasonably skilled men can make 700–1,000 grafts an hour. The machine can also be adapted for cutting a single tongue on scions for field grafting. The preparation of the stocks in this case is facilitated by using a small hand saw that cuts grooves matching the tongues cut on the scions. The stock can be held steady during sawing by means of a simple wooden vice specially designed for the purpose.—Univ. Calif., Davis.

3220. LIDER, L. A., LEONARD, O. A., AND SISSON, R. L.
[Eradication of] ungrafted vineyard rootstock.
Calif. Agric., 1957, **11**(8): 3-4, illus.

In trials on the chemical destruction of unwanted vines, without causing damage to productive neighbouring plants, 100% kill was obtained with 200 c.c. or more of Shell DD injected in 4 shots around each plant and with Vapam-45 at 150 c.c. or more diluted with 3 gal. water and applied in a shallow trench around each plant. Carbon bisulphide gave erratic results and Vapam applied by soil injection was only effective when undiluted.—Univ. Calif., Davis.

3221. Baldini, E.
Contributo allo studio dei sistemi radicali della vite nella Sicilia orientale. **(Contribution to the study of vine root systems in eastern Sicily.)** [English summary ¾ p.]
Ann. Sper. agrar., 1957, **11**: 423-47, bibl. 22, illus.

Root penetration is compared in soils of different depth, texture and moisture content. There was intense competition between root systems of plants set 1 m. apart. Suitable cultivation depths are recommended for various soil types.

3222. Nitsch, J. P., and others.
Auxins in the Concord and Concord Seedless grapes in relation to berry development and drop.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xx.

During the 7 days after flowering both varieties showed a low growth rate and low auxin contents in the berries. At about 7 days after flowering the auxin level reached its lowest point and berry drop was at a maximum. After this growth rate and auxin content started to increase in both varieties. Between 20 and 26 days from flowering in the Concord variety the endosperm developed rapidly in the seeds, and the growth rate and auxin content of the berries were high. In Concord Seedless the endosperm started to degenerate at this time, and both growth rate and auxin level decreased.—Cornell Univ., and N.Y. St. agric. Exp. Stat., Ithaca.

3223. Wagner, E.
Über das Auftreten von Pollenkörnern mit abnormer Keimporenzahl bei der Weinrebe. **(On the incidence of pollen grains with an abnormal number of germ pores in vines.)**
Vitis, 1957, **1**: 9-13, bibl. 4, illus.

Cold and heat treatment of vine inflorescences during meiosis resulted in the incidence of pollen grains with 2, 4, 5 or 6 germ pores, 3 being normal. The relationship between the size of the nucleus and the number of germ pores is discussed.—BundesforschAnst. Rebenzücht. Geilweilerhof.

3224. Antcliff, A. J.
Salt status and time of bursting of the sultana.
J. Aust. Inst. agric. Sci., 1957, **23**: 76-7, bibl. 3.

Correlation coefficients are tabulated relating mean time of bursting per vine in spring to petiole chloride determinations made in the preceding and following summers at 3 sites in the Sunraysia district for 4 seasons. The correlation was invariably negative, i.e., the higher the chloride the earlier the burst, but not always significant. It is concluded that excessive salt will cause early bud burst, but it is not a major factor affecting time of bursting.—C.S.I.R.O., Commonw. Res. Stat., Merbein, Vict.

3225. Dikshit, N. N.
Some aspects of parthenocarpy in fruit plants.
South Indian Hort., 1956, **4**: 64-9, bibl. 45.

Inducing parthenocarpy in vine by girdling shoots and in papaya by removal of leaves, while successful, is regarded as too drastic and not advisable. Application of dead pollen extract to the stigmas appears to be promising for commercial production of parthenocarpic fruit. The method has been used successfully in the case of cucurbits, eggplant, pepper and tomato.

3226. Maxwell, N. P.
Girdling seedless grapes in the Rio Grande Valley of Texas.
J. Rio Grande Valley hort. Soc., 1957, **11**: 93-4, bibl. 1.

The first years' results are reported of an experiment designed to see whether ringing would increase berry size in the seedless, early-maturing, small-berried, vinifera varieties Thompson Seedless and Perlette. The rings, 3/16 in. wide, were cut in mid-April, when the berries were about the size of buckshot, and the bunches were also thinned. Compared with unringed vines, ringing resulted in increases in berry size ranging from 27·4 to 34·5% without any appreciable change in the percentage of total solids.—Tex. agric. Exp. Stat., Weslaco.

3227. Harris, W. B., and Coombe, B. G.
Progress report on pruning Malaga grape vines.
J. Dep. Agric. S. Aust., 1957, **60**: 351-3, 356, illus.

The grape variety Malaga, known elsewhere as Waltham Cross or Rosaki,* is grown in South Australia mainly for wine and to some extent for drying. Under irrigation it presents problems in pruning, because the lower buds on 2-bud spurs are apt to remain dormant, while the upper buds develop into excessively vigorous canes. Three years' results from a pruning trial in Berri Experimental Orchard suggest that Malagas are best pruned by the Bordelais espalier system using 6 canes and all available spurs. Rod and spur pruning has also given bigger crops than the usual spur pruning method. The higher yields from the Bordelais espalier and rod and spur methods are attributed to the greater number of buds left on the vines and to positional differences in the fruitfulness of buds along the canes.

3228. Cook, J. A., and Kishaba, T.
Using leaf symptoms and foliar analyses to diagnose fertilizer needs in California vineyards.
Plant Analysis and Fertilizer Problems, I.R.H.O., Paris, 1957, pp. 158-75, bibl. 17, illus.

The nitrate level of the petioles at blossom time was found to be of practical value in diagnosing N needs of Thompson Seedless vines [see *H.A.*, 27: 2216]. Petiole and shoot-tip analyses showed wide differences in K content between normal vines and those with deficiency symptoms, but a yield response to K was only obtained in vineyards showing leaf deficiency symptoms. A limited number of shoot-tip analyses from midsummer samples showed that Zn levels of 5–51 p.p.m. were associated with Zn deficiency symptoms.

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* Perold in his Treatise on Viticulture, Macmillan, 1927, cites a quite different "Malaga".

3229. HUGUET, F.
Traitements anticryptogamiques et alimentation azotée foliaire de la vigne. **(The addition of urea to fungicidal sprays applied to vines.)**
Ann. agron., 1956, **7**: 1093-6.

Four treatments were given to an old vineyard which had not been manured for 25 years; they were bordeaux mixture at 2%, Captan at 0·25% commercial product, bordeaux 2%+urea 0·7% and Captan 0·25%+urea 0·7%. Application to the foliage was made at high pressure on 27th April, 10th May, 1st June, 9th June and 16th July, plus 1 general spray of bordeaux or bordeaux+urea on the 20th July. Figures given indicate the following physiological repercussions: Bordeaux depresses and captan stimulates growth. Nutrition by urea has interesting results on vine metabolism, namely migration of sugars towards the fruits, increased production of wood and of grapes, and increased total mineral nutrition of the leaves before flowering.

3230. SALMANOV, A. B.
The effect of various methods of mineral-fertilizer application on the nutrient regime of light chestnut soil and on vine yields in the Dagestan ASSR. [Russian.]
Trudy̆ pochv. Inst. Dokuchaeva, 1957, **50**: 322-57, from abstr. in *Soils and Ferts*, 1957, **20**, abstr. 1361.

Field experiments involving (a) surface application, (b) placement in furrows (18–20 cm.), (c) two-layer placement (18–20 and 35–40 cm.), (d) deep placement (35–40 cm.), and (e) placement at 23–25 cm. depth showed a positive effect of N and P fertilizers. The average increases in vine yields over 3 years were 19% for (1), 28% for (b), 33% for (e), 41% for (c), and 46% for (d). Deep placement of fertilizers increased the number of developed buds and the contents of N and P in the leaves. Lack of response to K was associated with high content of exchangeable K in the soil.

3231. DOBROLJUBSKIJ, O. K., AND SLAVVO, A. V.
The use of the trace element nickel in vine nutrition. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **112**: 347-9, bibl. 9.

$NiSO_4$ applied to the soil at 0·05 g. in 2 l. water per vine before flowering increased the size of the grapes and thereby yields by 23%, but had no effect on quality. Spraying with $NiSO_4$ at $5\cdot10^{-3}$ g. and $5\cdot10^{-5}$ g. per plant before flowering (followed by heavy rain), at the height of flowering and when the grapes were about the size of a pea, increased the size of the grapes and their sugar content and reduced acidity as compared with the controls. The increase in sugar content was confined to glucose, fructose being unaffected by Ni. Neither the soil nor the foliar treatments had any appreciable effect on the fermentation of the must.

3232. BENSON, N. R., BULLOCK, R. M., AND CHMELIR, I. C.
Response of Concord grapes to cultural treatments and fertilizers.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 235-9, bibl. 5.

Concord grapes were grown under redtop or alfalfa cover crops and in land that was kept cultivated in summer with vetch sown after harvest, in all cases with or without N, P and K fertilizers. Yields were highest with summer cultivation and very poor with redtop sod. N deficiency proved to be the deciding factor in the redtop plots, there being no response to P or K. After 2 years it was found that the addition of 60 lb. N per acre was insufficient to maintain proper vigour. The dose was then increased to 100 lb. whereupon vigour and production markedly increased in the redtop plots. —Tree Fruit Exp. Stat., Wenatchee, Wash.

3233. FLEMING, H. K., AND ALDERFER, R. B.
Cultivation and Concord grape production.
Bull. Pa agric. Exp. Stat. **616**, 1957, pp. 18, bibl. 11.

Seven cultural practices for vineyards were studied over a 9-year period on soils showing 3 degrees of erosion. Small differences in growth and yields were apparent but these were not significant. Vine growth and yield were reduced by competition from cover crops but the depressing effect lasted only as long as the competition continued. Cultivation after 3 years in Ladino clover sod resulted in stimulation of growth and yield of vines in severely-eroded vineyards; yield improvements during the subsequent 6 years of cultivation were more than enough to compensate for the growth reduction during sod cultivation. It is concluded that some cultivation is necessary for maximum production of Concord grapes unless a deep mulch is maintained.

3234. IOWA STATE COLLEGE.
Your experiment station reports. Cultural practices on grapes tested.
Ia Fm Sci., 1957, **11**(9): 19.

The effect of permanent lespedeza and rye-cultivation plots on Concord grape yields was studied. Average yields for 1949–55 were slightly higher on the rye-cultivation plots. Grapes matured earlier on the lespedeza plots, although sugar content was lower than from rye-cultivation plots. In weed control tests CMU at 4 lb. per acre gave excellent control of all weeds except morning glory. In a potash experiment and a high-rate P experiment growth of cover crops was increased without grape yield increases. Application of 80 lb. of N per acre with or without P reduced yields per vine.

3235. PRUITT, W. O., AND CLORE, W. J.
Irrigating Concord grapes in South Central Washington.
Proc. Wash. St. hort. Ass., 1956, pp. 174-8, illus.

Vines should be irrigated before foliar signs of drought appear. The symptoms are described and compared with those of sunburn. A drawing is shown of a simple, inexpensive, home-made tool for soil sampling to determine when to irrigate and the depth of water penetration.

Nuts.

(*See also* 3190a, 3240l, s, t, v, 4012.)

3236. CERCVADZE, —.
Frost resistance of almond. [Georgian, with Russian summary.]
Tr. Opyt. st. plodov. AN Gruz SSR, 1956, **4**: 103-13, from abstr. in *Ref. Ž.* (*Biol.*), 1957, No. 6, abstr. 22834.

Results of observations on the effect of frost in 1946–47, 1948–49 and 1949–50, with a minimum temperature of −30·5° C., showed that the most frost resistant almond varieties were those grown locally in Georgia, in particular the variety Saburtalos nuši. The majority of foreign varieties were seriously damaged at −25° C. and killed at −30° C. The flower buds of the varieties Nonpareil, No. 321, No. 475 and especially J.H.L., however, were relatively resistant to frost. These varieties are late flowering, thin shelled, with a high yield of kernels and are being used for the improvement of local frost resistant almonds.

3237. KOCH, E. J., AND HUNTER, J. H.
The use of experimental design and covariance techniques for increasing precision of pecan experiments.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 170-5, bibl. 2.

In most bearing pecan orchards variations in tree size, the large area occupied by each tree and the mixture of varieties often encountered make it difficult to obtain the experimental precision necessary to measure responses to fertilizers satisfactorily. Studies have shown that when single-tree plots are used it is undesirable to destroy a random arrangement of treatments by re-arranging the lay-out to obtain similar mean cross-sectional areas of the trees in each treatment. However, the use of cross-sectional area measurements as an independent variable in covariance analysis has been shown generally to result in increased precision with reduced coefficients of variation. Additional precision has been obtained by using both cross-sectional area and nut yields, recorded in the year when differential fertilizer applications started, as independent variables in multiple covariance analyses of combined 5-year yields.—U.S. Dep. Agric., Beltsville, Md.

3238. LYNN, C., AND HARTMANN, H. T.
Rooting cuttings under mist.
Calif. Agric., 1957, **11**(5): 11, 15.

Leafy, softwood cuttings of paradox walnut hybrids (*Juglans hindsii*×*J. regia*), which are much in demand as rootstocks, can be rooted in mist propagation beds, but the problem of inducing these cuttings to continue top growth remains to be solved. The best rooting, 53 to 73%, was obtained with cuttings taken in June and July and dipped for 5 seconds in 6,000 and 8,000 p.p.m. IBA in 50% alcohol. Without IBA treatment no cuttings rooted and with concentrations of IBA above 8,000 p.p.m. some injury occurred. Cuttings taken from 2-year-old trees rooted better than those from 5-year-old trees. Methods of hardening-off rooted cuttings are discussed.—Univ. Calif., Davis.

3239. ROSCHACH, H.
Die Bestimmung geringer, kurzfristiger Änderungen des Gesamtstickstoffgehaltes gegenständiger Fiederblättchen von *Juglans regia*. **(The determination of small, temporary changes in total nitrogen content in opposite leaflets of *Juglans regia*.)**
Gartenbauwiss., 1956, **21**: 367-77, bibl. 11, illus.

The dry weight and N content per sq. cm. of surface area in both opposite and neighbouring walnut leaflets showed a linear correlation. There was almost no change in leaf surface area during the period of 1 day. The difference between relative N contents in leaflets cut in the morning and in the evening showed a difference of about 0·1%, being rather lower in the evening.—Landw. Hochsch. Hohenheim, Stuttgart.

Noted.

3240.

a BOUBALS, D.
Amélioration de la résistance de la vigne au mildiou (*Plasmopara viticola* (B. et C.) Berlèse et de Toni. Recherche de géniteurs de resistance. **(Improvement of resistance of vines to mildew (*Plasmopara viticola.* Quest for resistant breeding stocks.)** [English, German and Russian summaries ½ p. each.]
Ann. Amél. Plantes, 1956, **6**: 481-525, bibl. 8, illus.

b CANT, R. R., AND NELSON, K. E.
Factors affecting the concentration of the sulfur dioxide in fumigation atmospheres for table grapes.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 240-9, bibl. 9, illus.

c COSMO, I., COMUZZI, A., AND SAVIAN, A.
Indagini sulla ricostituzione viticola in provincia di Venezia. Prima contributo. Zona del Livenza e Tagliamento. **(Studies of reconstitution of vineyards in the province of Venice. Part 1. Region of Livenza and Tagliamento.)** [English summary 8 lines.]
Ann. Sper. agrar., 1957, **11**: 317-60, bibl. 4, illus.
With special reference to varieties.

d COSMO, I., AND POLSINELLI, M.
Cabernet Franc. **(The Cabernet Franc grape.)** Merlot. **(The Merlot grape.)** [English summaries 9 and 10 lines.]
Ann. Sper. agrar., 1957, **11**(2), Suppl. pp. ccxiii-ccxxii, bibl. 8, illus., and pp. ccxxiii-ccxxxiv, bibl. 9, illus.
Descriptions of wine varieties with blue-black fruits.

e CRAIG, D. L.
The value of virus-free strawberry plants.
A.R. N. Scotia Fruit Grs' Ass. 1956, pp. 81-3.

f Dalmasso, G.
Viti e vini nel Paese del Sol Levante. **(Vines and wines in Japan.)**
Ital. agric., 1957, **94**: 401-12, bibl. 1, illus.
Production, training systems, varieties, propagation, soil management and control of pests and diseases.

g Dobroljubskij, O. K.
Microelements in viticulture and wine making. [Russian.]
Vinodelie i Vinogradarstvo, 1957, **17**(3): 19-22, bibl. 23.
A review of Russian work [much of which has been abstracted].

h Eaton, E. L.
The spread of blueberry seed through manure and by migrating robins.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 293-5, bibl. 13.
In Nova Scotia.

i Eaton, E. L., and others.
The cranberry.
Publ. Canada Dep. Agric. **810**, revised 1957, pp. 28, illus.
Culture, diseases and pests. For first edition see *H.A.*, 19: 927.

j (Hamilton, W. A.)
Prepackaging table grapes.
Amer. Fruit Gr, 1957, **77**(8): 12, illus.
Successful results with 2-lb. trays covered with cellophane.

k Heggli, M.
Blomst- og kartfall hos solbaer og rips. **(Running off in black and red currants.)**
Frukt og Baer, 1957, **10**: 57-63, bibl. 11.
A review.

l Jaskevič, R. T.
Characteristics of the anatomical structure of the wood of certain almond species. [Russian.]
Bot. Žurnal, 1956, **41**: 1172-7, bibl. 8, illus.
Wood and leaf anatomy of *Amygdalus communis*, *A. nana* and some other species.

m Lilly, P. L.
A taxonomic study of the genus *Rubus* in Pennsylvania.
Diss. Abstr., 1957, **17**: 957-8, being *Publ.* 20,964 of 102 pp.
Blackberries, raspberries and dewberries.

n Patel, G. I., and Olmo, H. P.
Induction of polyploidy in the sterile F_1 hybrids of *Vitis vinifera* Linn. and *Vitis rotundifolia* Mich. X.
Phyton, 1956, **7**: 63-8, bibl. 5, illus.
Colchicine treatment of F_1 seedlings of *V. vinifera* × *V. rotundifolia*.

o Powell, J. V., and Berberich, R. S.
Marketing tree nuts. Trends and prospects.
Market. Res. Rep. U.S. Dep. Agric. **139**, 1956, pp. 38.
Production and consumption of almonds, filberts, pecans and walnuts in the U.S.A. from 1929.

p Rivals, P.
Aperçu sur les conditions de viticulture tropicale de montagne. **(A sketch of the conditions for tropical viticulture in the mountains.)**
Rev. agric. Réunion, 1956, **56**: 256-9.
Problems reviewed.

q Sasaki, S., Maeda, T., and Sato, T.
Results of strawberry breeding. I. On the selected four new strains. [Japanese, with English summary ⅔ p.]
Reprinted from *Reps Tohoku nat. agric. Exp. Stat.* **4**, 1955, pp. 129-32, bibl. 3.
Varieties for cold districts of Japan from Fairfax, Dorsett and Ettersburg crossings.

r Smith, J. B., and Darrow, G. M.
Production of virus-free foundation strawberry stocks in a screenhouse.
Plant Dis. Reptr, 1957, **41**: 573-5, bibl. 1, illus.

s Stefani, A.
La coltura del nocciuolo nella realtà tecnica, economica e sociale. **(Hazel nut growing in its technical, economic and social aspects.)**
Ital. agric., 1957, **94**: 413-25, illus.

t Tesche, W. C.
The walnut and filbert industries of the Mediterranean basin.
Foreign Agric. Rep. U.S. Dep. Agric. **93**, 1956, pp. 48, illus.
Walnuts in France, Italy and Turkey; filberts in Italy, Turkey and Spain.

u Turner, D. H.
Fruit growing in the Dundee area.
Scot. Agric., 1957, **37**: 5-10, bibl. 3, illus.
Predominantly raspberries.

v U.S. Department of Agriculture.
Tree nuts by states, 1949-55. Revised estimates.
Statist. Bull. U.S. Dep. Agric. **195**, 1956, pp. 14.
Production, use and value of edible tree nuts tabulated.

w Uota, M.
Preliminary study on storage of Emperor grapes in controlled atmospheres with and without sulfur dioxide fumigation.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 250-3, bibl. 7.

x Williams, C. F.
Relation of berry size to flower type of seedlings in muscadine grape crosses.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 254-60, bibl. 9.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 3337c, f, g, 3338d, 3999, 4009, 4010.)

3241. EPPO.
Second reports of the working party on phytosanitary regulations [French and English], Paris, 1957, pp. 27.

Certain factors which complicate quick transit of plant materials are considered. Two appendixes give details of (1) the amount of produce dealt with by inspectors in different European countries and (2) the basis of appointment of inspectors in different countries and their numbers.

Disturbances of nutrition or of unknown origin.

(*See also* 3180-3183, 3224.)

3242. Higdon, R. J.
Pear tree chlorosis with special reference to its correction with chelated metals.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 101-9, bibl. 7, illus.

EDTA (ethylenediamine tetraacetic acid) as well as its Fe and Na salts was highly toxic to pear foliage and fruits. DTPA (diethylenetriamine pentaacetic acid) and its Fe salt was practically non-toxic to the leading pear varieties at 2·5–3·0 lb. per acre in 100–300 gals. water. Two applications during the first half of the growing season appeared to give satisfactory control, but sometimes a third may be necessary. Phytotoxicity of EDTA depended on season of application, concentration and wetting agents. The effects of treatment on the composition of the leaves are discussed.—Ore. agric Exp. Stat., Medford.

3243. Trocmé, S., and Chabannes, J.
Chlorose des arbres fruitiers. (**Chlorosis of fruit trees.**)
Ann. agron., 1956, **7**: 1098-1100.

The authors note that the addition of HEEDTA to calcareous soils is sometimes efficacious in the case of pear trees and sometimes not. This is probably due to its comparative immobility in the soil. EDTA is less effective, though good effects have sometimes followed its application by fertilizer lance just before growth starts. Work is now in progress on spraying foliage with chelates—here again the immobility of the chelate is noticeable—and on liquid injections into the trunk.

3244. Anon.
Chlorose bestrijdingsproeven. (**Experiments on the control of chlorosis.**)
Fruitteelt, 1957, **47**: 609-13, bibl. 3, illus.

Some preliminary results on the use of iron chelates for controlling chlorosis of apples are described. Soil treatment appears to be the most satisfactory method of application. No definite effect of rootstock on chelate uptake was apparent. The use of a chelating compound suitable for the particular soil type is most important.

3245. Wiederspahn, F. E.
Controlled manganese deficiency of apple.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 17-20, bibl. 13, illus.

Rome apples were grown in the greenhouse in nutrient solutions containing 0·25 (normal), 0·001 and 0·0 p.p.m. Mn, and symptoms were observed. Leaves mature prior to exposure to Mn deficiency remained green. Leaves expanding when the deficiency was imposed continued to show normal green colour until the leaves above began to expand, when interveinal fading occurred. Mn-deficient seedlings showed reduction in axillary shoots, fresh weight, dry weight, and percent dry weight of tops and roots. Root growth was less but there was no appreciable difference in root diameter or colour. As Mn decreased in the leaf the soluble Fe increased, but there was no significant difference in insoluble or total Fe content.—Rutgers Univ., N. Brunswick.

3246. Mezzetti, A., Baldassari, T., and Vespignani, A.
La plara delle mele. II. III. IV. (**Non-parasitic lenticel rot of apples. II. III. IV.**)
[English summaries $\frac{1}{3}$, $\frac{1}{3}$ and $\frac{2}{3}$ pp.]
Ann. Sper. agrar., 1957, **11**: 159-91 + 12 tables, bibl. 7, illus.; 361-98, bibl. 2; 399-421, bibl. 13.

In part I [see *H.A.*, 26: 2563] the non-parasitic nature of "plara" was established. Part II concerns statistical methods for collecting and dealing with data on the influence of cultural and environmental factors on the incidence of the disorder in harvested and stored apples. Part III includes data from 3 consecutive years' work involving differences in pruning, mineral N nutrition and irrigation, as well as crop load, fruit size and meteorological records. Part IV presents the conclusions that: (1) the disorder was increased by heavy pruning but unaffected by mineral N or by irrigation; (2) the incidence was higher in ordinary than in cold storage; and (3) the condition of the tree as a whole influenced it far more than did the condition of the individual fruits. Among climatic factors early autumn rains and fogs probably played an important part.

3247. Merrill, T. A.
Pear decline—a progress report.
Proc. Wash. St. hort. Ass., 1956, pp. 42, 44-5.
Woodbridge, C. G., Blodgett, E. C., and Diener, T. O.
Pear decline in the Pacific northwest.
Plant Dis. Reptr, 1957, **41**: 569-72, bibl. 6, illus.

There seem to be 2 types of pear decline in Washington: slow decline, which develops over several years as a gradual loss of tree vigour, and quick decline causing in apparently healthy trees sudden wilting and death. Both types of decline have been found in Bartlett (most seriously affected), Anjou, Bosc and Winter Nelis. A summary is given of the work undertaken in the past year by a committee appointed to determine the extent of the trouble and to try to find its cause.

3248. Williams, R. R., and Campbell, A. I.
Rosetting: growing problem with pears.
Grower, 1957, **47**: 1521-2, illus.

Stunted growth and rosetting in maiden pear trees have been increasingly observed in varieties budded on quince rootstocks. Some dessert and perry varieties are classified according to susceptibility. Double-working with Beurré Hardy alleviated the symptoms but did not produce satisfactory trees. Rosetting has not occurred on seedling pear stocks. The possibility that the disorder may be due to a virus is being investigated.—Long Ashton Res. Stat.

3249. Picco, D., and Scaramuzzi, G.
Una variegatura virus-simile delle foglie di ciliegio. (**A virus-like variegation of cherry leaves.**) [German and English summaries ½ p. each.]
Phytopath. Z., 1957, **30**: 181-8, bibl. 6, illus.

The authors describe a variegation of cherry leaves occurring on the variety Bigarreau Moreau in the Parma area. Failure to transmit the symptoms allows the conclusion that the trouble is due to a bud mutation.—Lab. crittogam. ital., Pavia.

Climatic factors.

(*See also* 3031-3033, 3081, 3089m, t, 3107, 3200, 3215, 3236, 3415, 4011, 4029w.)

3250. Goidànich, G.
Un'indagine sugli effetti del gelo sulla frutticoltura Emiliana. (**Enquiry into the effects of cold on fruitgrowing in Emilia.**)
Progresso agric., 1956, **2**: 213-31, illus.

With a view to determining the damage done and the best methods of making good such damage if it occurs again, a detailed examination was made of the effect of exceptionally cold weather on peach trees, apples, pears, cherries, plums, apricots, vines, kakis, figs and olives. The peak of the cold period was from 13 to 16 February when temperatures as low as −21 and −24° C. [−6° and −11° F.] were recorded preceded and followed by long periods in which the temperature means remained below freezing. This followed a somewhat short, mild winter which had resulted in dormancy being broken to some extent. The damage done to different peach varieties is tabulated and illustrations are given of wood sections and of sections through flower and wood buds and through young and older shoots in peach and apple.

3251. Simons, R. K.
Frost injury on Golden Delicious apples—morphological and anatomical characteristics of russeted and normal tissue.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 48-55, bibl. 9, illus.

Comparisons are made through maturation between normal tissues of Golden Delicious apple fruit and those of fruits injured by two frosts, one at and one just after full bloom. Photomicrographs illustrate normal and injured epidermal tissue.—Univ. Ill., Urbana.

3252. Lott, R. V.
The quality and keepability of Golden Delicious apples having russet bands caused by frost.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 56-64, bibl. 8.

Except for the russet appearance and the tougher skin there were no significant differences in the qualities of the normal and the frost injured apple. This held good after storing both for 120 days at 31° F. at variable relative humidity.—Univ. Ill., Urbana.

3253. Tkačenko, G. V.
The effect of low temperatures on the vitality of vine buds in Transcarpathia. [Russian.]
Sad i Ogorod, 1957, No. 5, pp. 65-6.

Following the very severe winter of 1953/54 and the normal season of 1955/56 examinations of 6 vine varieties grown on 35–40° slopes showed no difference in frost damage between south-west and south-east aspect but a decrease in damage with increase in elevation. The buds along the middle of the shoot were in general more frost resistant than those at the base or apex.

3254. Šobek, J.
Vliv počasí v zimě 1955–1956 na poškození vlašských ořešáků. (**Damage to walnut**
[Russian, English and German summaries
trees caused by the winter 1955-1956.)
¼ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 133-40, bibl. 8, illus.

Frost damage to walnut trees in 1956 was influenced not only by the minimum temperatures in February but also by the maxima in January. Other factors affecting the extent and degree of frost injury were the physiological resistance of individual trees, wood maturity, soil types and weather conditions following the frost. The sensitivity of the different organs of the tree to low temperatures is discussed.

3255. Goodall, G. E., and others.
Effectiveness of wind machines.
Calif. Agric., 1957, **11**(8): 7-9, illus.

The effects are recorded of a large conventional wind machine and of a ramjet machine in 2 deciduous orchards. Under conditions of moderately strong inversion (temperature differences of over 7° F. between soil surface and air 40–50 ft. above it), both machines afforded protection over comparatively large areas. The heat from the ramjet burners was also of considerable benefit. Under conditions of weak conversion (differences of 1·4 to 3·5° F.) both machines had much less effect, and the heat from the ramjet burners was concentrated near to the machine. There was evidence in both orchards that as a cover crop grew taller the reponse to the wind machines becames smaller in the lower parts of the trees.—Univ. Calif., Davis, etc.

3256. Schultz, H. B., and Parks, R. R.
Frost protection by sprinklers.
Calif. Agric., 1957, **11**(6): 8-9.

Preliminary tests in several areas, including a blueberry field, are described briefly. The results indicate that about 0·08 in. per hour of artificial rain is needed to provide protection under average spring frost conditions in California.—Univ. Calif., Davis.

3257. Marenkin, F. S.
Irrigation with waste water—an effective method of spring frost control. [Russian.]
Sad i Ogorod, 1957, No. 5, pp. 33-4.

Data collected over 5 years in central Russia show that furrow irrigation increased the temperature of the soil by 0·7 to 1·5° C. and that of air by 0·8 to 2·4° C., and prevented temperatures falling below −1° C., thereby saving young vegetables from frost injury. The most striking results were obtained in an 8 ha. cherry orchard, one half of which was regularly furrow irrigated in the spring and escaped frost damage, while in the other unirrigated half the crop was lost.

3258. Bogun, S. S.
Spring frost control. [Russian.]
Sad i Ogorod, 1957, No. 4, pp. 68-9.

In Central Asia the copious application of irrigation water 5–7 days before uncovering vines delayed warming up of the soil and retarded the development of buds and shoots, which thus escaped frost damage.

3259. Schneider, M.
Verteilung der Minimumtemperaturen in Strahlungsnächten und Frostschutzberegnung im Weinberg des Weingutes Schloss Saaleck. **(Distribution of minimum temperatures in nights of radiation frost and sprinkler irrigation as a means of frost control in the vineyard of Saaleck castle.)**
Mitt. Klosterneuburg, Ser. A, 1957, **7**: 122-30, bibl. 16.

Frost protection by sprinkling was tested in a vineyard in Lower Franconia. The apparatus used and the effect of irrigation on temperatures and vines are discussed. When minimum temperatures of −5·1° C. were recorded the temperature of the irrigated area did not fall below 0·5° C. The ice-covered instruments showed a constant temperature varying between 0 and 0·5° C. and presumably the temperature of the iced over plant parts was the same. The vines remained undamaged except where a breakdown in sprinkling occurred.

3260. Maxie, E. C., and Claypool, L. L.
Heat injury in prunes.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 116-21, bibl. 5.

It is believed that anaerobic conditions may occur in the inner mesocarp tissues of prunes during periods of high orchard temperatures. The relationship between oxygen deficiency and heat injury symptoms was therefore investigated in trials under highly artificial conditions. It was found that respiration of French prunes increases with increased oxygen atmospheres above 21% at high temperatures. Oxygen atmospheres above 21% exert a protective action against the development of heat injury symptoms. Typical heat injury symptoms were induced at 68° F. by oxygen tensions of 1 and 2·5%, i.e. much lower than that in air.—Univ. Calif., Davis.

3261. Ministry of Agriculture, London.
Shelter belts for farmland.
Fixed Equipment of the Farm Leafl. **15**, revised 1957, pp. 13, illus., 1s. 3d.

Types, purpose and effects of shelterbelts are first discussed. Notes are given on citing and design according to terrain and situation. Choice of species and planting and after-care are discussed at length. Grants available and taxation alleviation in connection with the erection of shelter belts in the U.K. are considered.

Viruses.

(*See also* 3337a, e, h-j, o, y, 3338b, f.)

3262. Goidànich, G.
Le malattie da virus delle piante da frutto. **(Virus diseases of fruit trees.)**
Reprinted from *Progr. agric.*, 1956[?], No. 6, pp. 16, illus.

A discussion of the importance which is likely to be attached to the incidence of virus diseases in future is followed by short notes illustrated in colour on the major virus afflictions occurring on fruit trees in Italy at the present day. Seven differently named virus phenomena prevalent on peaches are discussed, 1 on plums, 6 on apples, 1 on pears, 1 on kakis and 1 on figs.

3263. Schuch, K.
Viruskrankheiten und ähnliche Erscheinungen bei Obstgewächsen. **(Virus diseases and disorders with similar symptoms in fruit crops.)**
Mitt. biol. Bundesanst. Berlin-Dahlem **88**, 1957, pp. 96, bibl. 101, illus.

Virus and virus-like symptoms of top and soft fruits occurring in European countries are described and illustrated, with brief notes on prevention of spread and selection and maintenance of virus-free stock.

3264. Richards, B. L., and Cochran, L. C.
Virus and viruslike diseases of stone fruits in Utah.
Bull. Utah agric. Exp. Stat. **384**, 1957[?], pp. 130+11 coloured plates, bibl. 33, $1.50.

The virus diseases of stone fruit in general in Utah (4) are first dealt with. This is followed by accounts of 7 peach viruses, 12 viruses found on sweet and 9 on sour cherry and of 2 on plums. Notes are given on prevention by exclusion from the area and prevention by reducing the virus reservoir in an orchard. In addition consideration is given to the following disorders which show virus-like symptoms but which are, however, non-transmissible: sweet cherry crinkle leaf, deep suture and white mottle, prune leaf spot and crinkle leaf and peach false wart and yellow spot. Further notes are given on nutritional disorders which may sometimes be confused with virus symptoms.

3265. Hockey, J. F.
Further observations on flat limb of Gravenstein.
Canad. J. Plant Sci., 1957, **37**: 259-61, bibl. 2.

The flat-limb disease of Gravenstein apple is shown to be of virus origin. French Crab rootstock was found to be a more susceptible host parent than the slower growing Anis and Antonovka stocks. Stem-grafted, apparently healthy Gravenstein trees were more susceptible to flat limb after the introduction of scions from affected trees than either root-grafted or budded trees. [Author's abstract.]—Canada Dep. Agric., Kentville, N.S.

3266. Posnette, A. F., and Ellenberger, C. E.
The line-pattern virus disease of plums.
Ann. appl. Biol., 1957, **45**: 74-80, bibl. 20, illus.

The disease, now usually called line-pattern of plum, has been described under many names in most countries where plums are grown extensively. Naturally infected trees show widely differing symptoms; this has two causes: (1) different varieties react differently to the same isolate of the virus, and (2) different isolates cause different symptoms in the same variety. Because the virus occurs in strains with different pathogenicities, the choice of indicator varieties is important when selecting virus-free material by transmission tests. Peach seedlings and the mazzard clone F12/1 were the most sensitive types found. The line-pattern virus does not become fully systemic in some varieties of plum. In this and other respects it resembles the viruses that cause apple mosaic; three isolates obtained from plum and two from apple produced similar symptoms in peach and apple. It is therefore suggested that plum line-pattern and apple mosaic viruses are caused by strains of one virus. [Authors' summary.]—East Malling Res. Stat.

3267. Stace-Smith, R., and Mellor, F. C.
Studies on *Rubus* virus diseases in British Columbia. IV. Transmission of raspberry mosaic viruses to *Fragaria vesca* L.
Canad. J. Bot., 1957, **35**: 287-90, bibl. 11, illus.

By means of the leaf-grafting technique attempts were made to transmit the two component viruses of raspberry mosaic, rubus yellow-net and black raspberry necrosis, separately and in combination, to three strains of *Fragaria vesca* L. Only the rubus yellow-net virus was transmitted to the strawberry and it induced severe symptoms. Neither the raspberry aphid, *Amphorophora rubi* Kalt., nor the strawberry aphid, *Pentatrichopus fragaefolii* (Ckll.), transmitted the yellow-net virus from raspberry to strawberry, although *A. rubi* was able to transmit the virus from strawberry back to raspberry. [Authors' abstract.]—Plant Path. Lab., Canada Dep. Agric., Vancouver, B.C. [For Parts I-III see *H.A.*, 26: 1548, 1549, 3495.]

Bacteria.

(*See also* 3357z.)

3268. Crosse, J. E.
Bacterial canker of stone fruits. III. Inoculum concentration and time of inoculation in relation to leaf-scar infection of cherry.
Ann. appl. Biol., 1957, **45**: 19-35, bibl. 10.

Leaf scars on the fruiting spurs of the cherry varieties Roundel (high resistance) and Napoleon (low resistance) were inoculated with *Pseudomonas mors-prunorum* on 4 separate occasions in the autumn, using, on each occasion, the same range of 5 different inoculum concentrations. The results, recorded the following year, showed that the percentage diseased spurs (disease incidence) and the severity of the disease symptoms (disease severity) both increased with inoculum concentration. The *median threshold concentration of inoculum* (T.C.50), defined as the concentration necessary to give 50% diseased spurs, varied with time of inoculation, but on all occasions was considerably higher for Roundel than for Napoleon. In another experiment the leaf scars at the nodes of the current year's growth, inoculated at weekly intervals throughout the autumn, were found to be susceptible from the beginning of September to the latter part of October. During this period disease incidence varied considerably with time of inoculation. There was evidence that this variation was related to two factors which influenced the number of bacteria penetrating into leaf scars, namely, (1) the rate of evaporation of the infection drop, and (2) the rate of suction of inoculum into the vessels of the leaf traces. The experiments provided evidence of a long infection period beginning early in the autumn. It is suggested, therefore, that the timing of bactericidal sprays in the autumn be advanced and that the present concept of 'protective' sprays in disease control be replaced by one based on the eradication of external sources of inoculum. [Author's summary.]—East Malling Res. Stat. [For part II see *H.A.*, 26: 3497.]

3269. Crosse, J. E.
Streptomycin in the control of bacterial canker of cherry.
Ann. appl. Biol., 1957, **45**: 226-8, bibl. 2.

In an experiment where streptomycin preparations were compared with bordeaux mixture sprays for the control of bacterial canker (*Pseudomonas mors-prunorum*) in the leaf spot and canker phases of the disease on Napoleon and Roundel cherries, it was found that both sprays significantly reduced the disease. Bordeaux mixture was superior to streptomycin as a surface bactericide. Evidence is being sought of systemic activity of streptomycin.—E. Malling Res. Stat.

3270. Zuckerman, B. M.
Field evaluation of antibiotics for control of crown gall on the cultivated highbush blueberry.
Plant Dis. Reptr, 1957, **41**: 674-7.

Treatment of blueberries with antibiotics did not suppress crown gall formation and, with the exception of neomycin, it reduced yields.—Cranberry Exp. Stat., East Wareham, Mass.

Fungi.

(*See also* 3147, 3216, 3229, 3240a, 3337b, d, k, m, q, 3338a, g, h.)

3271. Darley, E. F., Miller, P. A., and Zentmyer, G. A.
Research on *Armillaria mellea* (oak root fungus) in southern California.
Comb. Proc. nat. Shade Tree Conf. 1956, pp. 279-83.

The principal problems under investigation are soil fumigation with carbon disulphide and other chemicals, the role of the soil fungus *Trichoderma viride* in *Armillaria* control, the breeding of resistant orchard trees and ornamental trees and shrubs, and the occurrence of various pathogenic strains of *Armillaria*.

3272. Hirst, J. M., and Stedman, O. J.
Apple scab.
A.R. Rothamsted exp. Stat., 1956, 1957, pp. 113-14.

Spraying programmes based on thermograph and dew-balance records successfully controlled scab in the Wisbech area. A simplified dew balance has been designed, giving satisfactory readings. Spraying the ground in March with 500 gal. of 0·1% sodium DNOC per acre decreased liberation of ascospores from dead leaves by 92%. A spore trap used in summer caught most air-borne conidia in dry, sunny weather.

3273. Carrera, C. J. M., Costa, J. J., and Rasp, A.
Control químico de la sarna del manzano. **(Chemical control of apple scab.)**
Idia, 1956, Nos. 106/8, pp. 64-5.

In comparison with standard 2–2·5% calcium polysulphide treatment, a series of foliar sprayings with either captan at 240 g. or phygon at 60 g. per 100 l. gave excellent scab control and yield increases of 21% in Red Delicious apples. Where half the weight of captan or phygon was replaced by 400 g. of wettable sulphur the yield was 18% higher than from the standard treatment. Increase in fruit size was marked with phygon and outstanding with captan. Soil treatment with 0·5% sodium DNOC at spore liberation reduced the attack and gave a 5% increase on the average yield from fungicide-sprayed plots.

3274. Bakarcic, M.
Control de la sarna del manzano. **(Control of apple scab.)**
Idia, 1956, Nos. 106/8, p. 186.

A series of 3 treatments with calcium polysulphide at 1°, 0·5° and 0·5° Baumé gave 82% healthy fruit. Corresponding use of copper oxychloride at 500 g. per 100 l. gave 98% and Fermate at 180 g. per 100 l. gave 83%, while in the untreated controls only 6% was healthy. The disadvantage of the copper treatment was that it caused russeting.

3275. Moore, M. H.
Concentrate spraying of apple trees: I. Fungicidal efficiency of lime sulphur.
Ann. appl. Biol., 1957, **45**: 11-18, bibl. 7, illus.

Experiments are described in which the efficiency of undiluted lime-sulphur applied as a spray mist of small droplets, formed by and carried in a stream of compressed air, was compared on small Cox's Orange Pippin apple trees with that of diluted lime-sulphur applied either in the same way or by orthodox hydraulic spraying. The control without spray damage of apple scab (*Venturia inaequalis*) and apple mildew (*Podosphaera leucotricha*) was the criterion. The undiluted concentrate proved at least as effective and safe as the hydraulically applied dilute spray when a satisfactory method of application, by a paint spray gun, has been established. A 50% dilution applied in this way at increased volume proved equally effective, but a 10% dilution similarly applied failed to give satisfactory control of scab, probably because of the reduced dosage. [Author's summary.]—East Malling Res. Stat.

3276. Groves, A. B.
Apple powdery mildew control studies.
From abstr. in *Phytopathology*, 1957, **47**: 245.

Over 95% control of *Podosphaera leucotricha* was obtained with 3 formulations of Karathane when used throughout the season. Equally good control was obtained by using sulphur early and Karathane late in the season in combination with 4 standard organic fungicides. Anisomycin gave excellent control but was excessively phytotoxic at 200 p.p.m. Griseofulvin failed to control the disease. Karathane at ½ lb. per 100 gal. was only slightly less effective than at 1 or 1½ lb. Statistically the differences in the intensity of infection between leaf positions were highly significant on treated trees, but not on untreated trees.

3277. Slotboom, H. J.
Gloeosporium op appels. **(*Gloeosporium* on apples.)**
Fruitteelt, 1957, **47**: 588-90, illus.

Four scab-control materials were applied to Golden Delicious trees, by spraying from mid-June to mid-October at approximately fortnightly intervals. The best control of *Gloeosporium* was obtained with zinc carbamate, and captan gave fairly effective control.

3278. Marsh, R. W., Montgomery, H. B. S., and Edney, K. L.
Experiments on orchard spraying for the control of *Gloeosporium* storage rots of apples.
Plant Path., 1957, **6**: 39-41.

In trials with Allington Pippin at Long Ashton captan and ziram sprays gave better control of *Gloeosporium* rot than did glyodin. Two sprays in August and September gave better results than one spray in either August or September. Captan sprays in August also gave a certain amount of control of *Gloeosporium* on Cox's Orange Pippin on farms in Kent, Sussex and Suffolk.

3279. Olsson, K.
Försöksnytt i kampen mot gloeosporium. **(Experiments for the control of *Gloeosporium*.)**
Fruktodlaren, 1957, **28**: 26-8.

In preliminary trials with dessert apple varieties, the incidence of *Gloeosporium* was satisfactorily reduced by sprays of captan and ferbam. Seven other fungicides gave much less control.

3280. Darpoux, H., and Perrot, A.
Sur une méthode de traitements combinés curatifs-préventifs contre la tavelure du poirier. **(A method of combined curative and preventive treatment for control of pear scab.)**
Reprinted from *Phytiatrie-Phytopharmacie*, 1955, No. 4, pp. 181-5, bibl. 2.

A single curative-preventive spray treatment of phenyl mercury acetate or compound 655 R.P., each combined with captan, was compared with 2 or 3 spray treatments with each of these compounds separately. The most effective control was obtained by 3 preventive sprays of captan. Both of the combination spray treatments gave satisfactory control.—Stat. centr. Path. vég., Versailles.

3281. Darpoux, H., and Perrot, A.
Essais comparatifs de traitements par pulvérisation ordinaire et par jet porté contre la tavelure du poirier. **(Comparative tests with conventional spraying and mist blower against pear scab.)**
Reprinted from *Phytiatrie-Phytopharmacie*, 1955, No. 4, pp. 187-90, bibl. 5.

No significant differences appeared between the 2 spraying techniques. Pear scab control was most effective with 0·15% captan applied by high volume spraying and with 0·375% captan by low volume spraying.—Stat. centr. Path. vég., Versailles.

3282. Blodgett, E. C.
Coryneum blight control.
Proc. Wash. St. hort. Ass., 1956, pp. 98-9.

Coryneum beijerinckii attacks most stone fruits including peach, apricot, almond, sweet cherry and plum. Symptoms on twigs, fruit and leaves are described. Experiments have shown that bordeaux 6–6–50 is one of the most effective materials against the disease if applied in the autumn, preferably when most of the leaves have fallen and before the rainy weather starts. Phygon XL at 1 lb. per 100 gal. was also satisfactory, but fixed copper sprays appeared to be less effective as they do not weather so well.

3283. Cohoon, D. F.
A study of peach canker disease caused by _Fusicoccum amygdali_ Delacroix.
Diss. Abstr., 1956, **16**: 1753, being *Publ.* 18,461 of 65 pp.

Leaf and scale scars, and those left by fruit thinning or picking on 1-year-old wood, all formed points of entry for the fungus. The rate of development of resistance to infection by leaf scars was more rapid at high than at low temperatures. There were indications that the rate of callus formation and the subsequent suberization of cells in the callus layer of a variety may be contributing factors in the development of resistance to infection by leaf scars. —Rutgers Univ. [See also *H.A.*, 27: 288.]

3284. Gourley, C. O.
Strawberry diseases and their control.
A.R. N. Scotia Fruit Grs' Ass. 1956, pp. 89, 91-3.

Notes on leaf spot (*Mycosphaerella fragariae*), powdery mildew (*Sphaerotheca humuli*), grey mould (*Botrytis* sp.), stem rot (*Dendrophoma obscurans*), leak (*Rhizopus* sp.), root rots and virus diseases.

3285. Jeffers, W. F.
Soil treatments for control of the red stele disease of strawberries.
Plant Dis. Reptr, 1957, **41**: 415-18, bibl. 2.

Under controlled conditions chloropicrin was very effective in eradicating *Phytophthora fragariae* from infested soil. Thiram and CBP also were effective but caused severe plant injury at the concentrations used. Several fungicidal materials, including nabam and captan, were ineffective. Under field conditions none of the materials resulted in complete eradication of the red stele fungus, but methyl bromide and chloropicrin, at relatively low rates, gave a high degree of control. [From author's summary.]—Md agric. Exp. Stat., College Park.

3286. Müller, H. W. K.
Zum Auftreten und zur Bekämpfung des Erdbeermehltaues unter Berücksichtigung der Erdbeergraufäule. **(The occurrence and control of strawberry mildew, with special reference to grey mould.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1957, **9**: 85-8, bibl. 4.

The best results in mildew (*Sphaerotheca humuli*) control on Oberschlesien were obtained with a combination spray of TMTD+S, which also gave satisfactory control of grey mould (*Botrytis cinerea*). Starting just before full bloom, 3 sprays at 0·75%, should be applied at intervals of 10–14 days. Two additional sprays at 0·75% and 0·5%, applied after harvest were beneficial.—Staatsinst. angew. Bot., Hamburg.

3287. Ingram, J., Schofield, E. R., and Taylor, R. E.
An observation on the control of strawberry mildew.
Plant Path., 1957, **6**: 63-4.

Dinitrocaprylphenyl crotonate sprays applied at fortnightly intervals from mid-April gave excellent control of strawberry mildew (*Sphaerotheca humuli*). Sulphur treatments gave moderately good control but showed some phytotoxicity.—Luddington exp. Hort. Stat., and N.A.A.S., Evesham.

3288. DiMarco, G. R., and Davis, B. H.
Prevention of decay of strawberries with post-harvest treatments.
Plant Dis. Reptr, 1957, **41**: 460-4, bibl. 1, and abstract in *Phytopathology*, 1957, **47**: 244.

Several chemicals were tested in 1955 to determine their value in controlling *Botrytis* and *Rhizopus* rots of harvested strawberries. Captan at 1,200 p.p.m. (active) and mycostatin (Nystatin), an antifungal antibiotic, at 100 p.p.m. (active) were selected for use in a hydrocooler in 1956. A vacuum-cooled treatment was also included. A substantial reduction in decay was obtained with mycostatin added to the cooling water. Captan was less effective in controlling decay than mycostatin and it left an objectionable residue. Vacuum-cooled berries showed a high percentage of mold in these tests, probably due to slight injury of the berries caused by the treatment. [Authors' summary.]—N.J. agric. Exp. Stat., Rutgers Univ.

3289. Goidànich, G., and others.
La lotta antiperonosporica nei risultati di una sperimentazione collegiale. **(Control of downy mildew of vines resulting from concerted experiments.)**
Mimeograph Oss. fitopat. Bologna, 1956, pp. 55.

In brief this is an account of comparative trials at 9 centres on the merits of copper and non-copper fungicides, particularly zineb and captan, for the control of vine downy mildew (*Plasmopara viticola*). In actual control of mildew zineb and captan proved about as good as bordeaux mixture. Their advantages and disadvantages, as shown in the better vigour of the plants treated and in their possible effects on the incidence of powdery mildew, which themselves depend partly on the weather, are discussed at some length. Suggestions are made for rational use of the data afforded by the trials in drawing up spray programmes.

3290. Zubov, M. F.
The effectiveness of certain fungicides against mildew. [Russian.]
Vinodelie i Vinogradarstvo, 1957, No. 4, p. 44.

Captan and Phygon were about as effective against downy mildew on vines as 1% bordeaux, but Fuklasin was washed off by rain, giving less satisfactory results. Fuklasin and captan were not phytotoxic, but Phygon caused leaf burn in some cases.

3291. Baldacci, E., Fogliani, G., and Betto, E.
La lotta antiperonosporica nella vite con i prodotti a base di zineb. **(Control of downy mildew of vines with zineb products.)**
Publ. Ist. Patol. veg. Univ. Milano **87** (Racc. 5), 1956, pp. 55.

Zineb products at 0·3% were consistently more effective than 1% bordeaux mixture in trials lasting 4 years. They were perfectly miscible with wettable sulphur for combined control of downy and powdery mildews.

3292. Princ, Ja. I.
Intensifying downy mildew control. [Russian.]
Vinodelie i Vinogradarstvo, 1957, **17**(3): 28-31, bibl. 5.

A discussion, in which the author favours timing bordeaux applications according to the incubation period of vine downy mildew [*Plasmopara viticola*] rather than according to the development of the vines. In Moldavia in 1955 bordeaux applied by an aeroplane did not cover the lower leaf surface, buds or berries and did not control the disease, although the dates of application were right.

3293. Taylor, R. H.
Oidium (powdery mildew) of the grape.
J. Agric. Vict., 1957, **55**: 465-72, bibl. 13.

A discussion of work in other countries on grape powdery mildew caused by *Uncinula necator* is followed by an account of experiments in the 1954/55 and 1955/56 seasons at Glenrowan with new and old fungicides. The results, which are detailed, lead to the following recommendations: Apply colloidal sulphur at 4 lb./100 gallons with the ziram black spot sprays. Use bordeaux to control downy mildew, adding colloidal sulphur to it where oidium is very prevalent. Two sulphur dusts should be applied as routine, one three weeks after the last downy mildew spray and the other a month later.

3294. Vergnes, A.
Sur les traitements de l'anthracnose maculée (*Gloeosporium ampelophagum* Sacc.). **(Treatments for anthracnose of vines.) (*Gloeosporium ampelophagum*).)**
Progr. agric. vitic., 1957, **147**: 304-9, bibl. 7, illus.

For summer treatment 0·3% captan (50% active) was more effective than either 2% bordeaux mixture or 0·8% dithane (65% active), the two last being approximately equal. Tests of winter treatments preceding each of the above failed to establish the superiority of sodium arsenite over copper (unspecified) or a mixture of iron sulphate and sulphuric acid.

3295. Bazzigher, G.
Über Anfälligkeit und Resistenz verschiedener Wirte von *Endothia parasitica*. **(The susceptibility and resistance of various hosts to *Endothia parasitica*.)** [English summary ½ p.]
Phytopath. Z., 1957, **30**: 17-30, bibl. 21, illus.

Some histological reactions of the host to *Endothia* infection are described. There were indications of a correlation between disease resistance and respiration rate. Frost damage reduced the resistance of some chestnut species to the disease.—Eidg. Anst. forst. Versuchsw., Zürich.

Nematodes.

See 3104, 3337 l, 3342, 3773, 3893g.

Mites.

(*See also* 3332, 3333, 3337l, 3338c, 3602.)

3296. Boulanger, L. W.
The effect of *Metatetranychus ulmi* (Koch) feeding injury on certain metabolic activities of Red Delicious apple leaves.
Diss. Abstr., 1957, **17**: 1157-8, being *Publ.* 21,075 of 142 pp.

Several degrees of mite infestation were initiated and controlled on young potted apple trees in greenhouse conditions. Rates of photosynthesis and transpiration were reduced by mite feeding injury, in severe cases by about 50%. Leaves severely injured initially had a lower transpiration rate at the end of the study than those on which the population increase was gradual. Initial reduction in chlorophyll content appeared to have little effect on photosynthesis and transpiration. Starch production and translocation was still continued in severely injured leaves.—Univ. Illinois.

3297. Fjelddalen, J., and Stenseth, C.
Spesialmidler mot midder for bekjempelse av egg av frukttremidd (*Metatetranychus ulmi* Koch). **(Ovicides for the control of the fruit tree red spider mite.)**
Frukt og Baer, 1957, **10**: 77-81, bibl. 5, illus.

In 4 years' trials chlorbenside, CPBS and Tedion gave good results against summer eggs and young mites of *Metatetranychus ulmi* on apple, but Tedion needs further testing before it can be generally recommended. Chlorbenside and CPBS also killed winter eggs satisfactorily if applied at the green cluster stage. There was no spray damage on any of the varieties included in the test.

3298. Hamstead, E. O., and Gould, E.
Relation of mite populations to seasonal leaf nitrogen levels in apple orchards.
J. econ. Ent., 1957, **50**: 109-10, bibl. 6.

During 1953 and 1954 populations of *Tetranychus telarius* (two-spotted) and *Metatetranychus ulmi* (European red) mites on apples were substantially greater in plots which received higher N applications and showed higher leaf N than in plots which received and showed lower N levels. The seasonal mite peak followed closely the seasonal leaf N peak. The mite peaks in high- and low-N plots occurred simultaneously. The data show that a spray applied just after the seasonal population has started to drop might falsely be credited with greater effectiveness than an identical spray applied a few days earlier when the population is still increasing.—Ent. Res. Branch, U.S.D.A., and W. Va agric. Exp. Stat.

3299. SPARSIAŠVILI, D. G., AND MODEBADZE, V. P.
A cultural method of spider mite control. [Russian.]
Vinodelie i Vinogradarstvo, 1957, No. 4, pp. 42-3.

In Georgia in spider mite population counts on the susceptible vine variety Kaberne, between May 12 and 18, 40% of the mites were found on the bottom leaf, 33·2% on the second, 21·1% on the third, 5% on the fourth and only 0·7% on the fifth leaf. When all leaves were removed from a few heavily infested plants on May 12, 1955, better mite control was obtained than from spraying with 0·6% anabasine sulphate. The sugar content of the fruit juice from stripped plants was 20% and acid content 6·9 g./l. compared with 18·3% and 8·3 g./l. respectively in the controls. In 1956 stripping the first few leaves gave much more effective control than either cleaning the loose bark off the stems, smearing the stems with a kerosene-lime emulsion, spraying with 0·1% NIUIF-100, a combination of the above 3 methods, or spraying with 0·5% nicotine sulphate. The stripped plots produced 33·4 centners/ha. compared with an average of 23·9 centners/ha. in the other treatments, and matured 3 weeks earlier.

Insect pests.

(*See also* 3147, 4003.)

3300. VOGEL, W.
Die Astproben-Untersuchung als Prognosemethode für das Auftreten wichtiger Schädlinge im Obstbau. **(The examination of dormant shoots as an aid to forecasting the incidence of important fruit pests.)**
Flugschr. eidg. Versuchsanst. Wädenswil **57**, 2 Aufl., 1956, pp. 20, bibl. 7, illus.

A method based on the examination of dormant shoots is described which allows warning to be given of probable outbreaks of a number of important fruit pests. The technique is described with illustrations in detail. Experience has shown that the phenomena seen in the examination tally with subsequent pest incidence. Previous experience also affords an idea of the epidemic behaviour of individual pests, and shows that similar conditions prevail in large adjacent districts which suffer from the incidence of most pests. The method should, it is thought, be of considerable help to the advisory officer and research worker and it forms an indispensable basis for serious pest control.

3301. MICHELBACHER, A. E., AND HITCHCOCK, S. W.
Walnut aphid control.
Calif. Agric., 1957, **11**(5): 10, 15.

The outstanding aphicide tested on heavy infestations in 1956 was OMPA [schradan] applied once in amounts ranging from 0·43 to 2·10 lb. per acre. This compound was most readily absorbed by young leaves on trees making vigorous growth. As OMPA has not yet been registered for use on walnuts in the U.S.A., recommendations are made for the use of Systox (2 applications) or of BHC or nicotine followed by Systox. Alternatively parathion, malathion or TEPP can be used in areas where the aphid has not developed resistance to phosphorus insecticides.—Univ. Calif., Berkeley.

3302. MÖHRKE, P.
Erfahrungen über die Engerlingsbekämpfung in der Baumschule. **(Chafer control in nurseries.)**
Dtsch. Gartenb., 1957, **4**: 134-5, bibl. 2, illus.

Excellent control of chafer larvae was obtained by applications of Arbitex and Lartal powder [BHC preparations?] to the hole before planting fruit trees in the nursery. It was found advisable to dip the roots in a soil slurry to prevent injury caused by direct contact with the insecticide.

3303. GIRALDI, G.
Infestazione di *Rhamphus pulicarius* Herbst (Coleoptera, Curculionidae) osservata su ciliegi. **(Infestation of cherry trees by *Rhamphus pulicarius*.)** [English summary 3 lines.]
Ann. Sper. agrar., 1957, **11**(2), Suppl. pp. CCI-CCXII, bibl. 15, illus.

Pre-adult phases of the pest can be controlled by collecting all fallen leaves and either burning them or using them in breeding cages to rear natural parasites, particularly *Eunotus cretaceus* and *Cirrospilus vittatus* which give partial control. Parathion, DDT and ECE are suggested for use against the adults.—Osserv. fitopat. Veneto, Verona.

3304. SMITH, E. H.
Field and laboratory evaluations of lead arsenate, wettable sulfur and hydrated lime against the plum curculio.
J. econ. Ent., 1957, **50**: 177-83, bibl. 9.

Field tests in prune and cherry orchards and laboratory tests using green apples were conducted to determine the effect of combinations of lead arsenate, hydrated lime and wettable sulphur on the control of plum curculio, *Conotrachelus nenuphar*. In the field tests all treatments effected some control, the same materials giving higher control on cherry than on prune. The degree of control coincided roughly with the number of beetles inhabiting the trees following treatment. In the laboratory tests where females were confined on treated fruits, a reduction occurred in rate of feeding, oviposition and longevity. In all treatments a positive correlation between feeding and oviposition occurred. The death of some individuals was presumably due to desiccation rather than toxicity of ingested spray deposit. The inherent toxicity of lead arsenate was shown to be low. In reconciling these findings with control under practical conditions it is suggested that the residues of these materials are distasteful to the curculios, causing them to desert the trees. Those remaining on the treated trees feed at sub-normal levels which results in reduced oviposition while continued feeding leads to death.—N. York St. agric. Exp. Stat., Geneva.

3305. DE PETRI-TONELLI, P., AND ROSI, O.
Esperimenti di lotta contro la *Rhagoletis cerasi* L. eseguiti nel 1956 con un formulato (Rogor L) a base di N-monometilammide dell'acido O,O-dimetilditiofosforilacetico.

(Experiments on control of *Rhagoletis cerasi* conducted in 1956 with a product (Rogor L) based on the N-monomethylamide of O,O-dimethyldithiophosphorylacetic acid.) [English summary 9 lines.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 180-8, bibl. 13, illus.

Rogor L, a liquid containing 20% of the active principle, sprayed at 0·02% a.p. did not prevent the hatching of eggs laid on cherry fruit immediately after treatment, but killed the larvae as they hatched. Both normal and low-volume spraying gave over 99% control of heavy infestations. Results of residue studies will be reported later.

3306. Tullio, V.
Prove di lotta contro la *Rhagoletis cerasi*. **(Experiments for control of *Rhagoletis cerasi*.)** [English summary 8 lines.]
Ann. Sper. agrar., 1957, **11**(2), Suppl. pp. ccxxxv-ccxlvii, illus.

Two treatments between mid-May and mid-June with DDT, chlordane, lindane or various systemic insecticides, alone or in various combinations, reduced infestation from 80–90% to 1–1·5% in the first year, and repetition in the following year gave complete immunity.

3307. Rosillo, M. A.
1. Observaciones sobre ecología de moscas de la fruta. 2. Experiencias de substancias atractivas de las moscas de la fruta. **(Observations on fruit fly ecology and experiments with baits.)**
Idia, 1956, Nos. 106/8, p. 281.

The search for predators and parasites of Mediterranean and South American (*Anastrepha fraterculus*) fruit flies in the Salta province of Argentina has been unsuccessful, but good control of *Ceratitis capitata* resulted from spraying with aldrin, dieldrin or lindane at 0·2–0·3%. Emulsions of the first two were harmless to citrus seedlings and remained active for 30 days. Among possible baits proteic substances such as peptone and gelatin were promising, but needed borax for preservation. Wine vinegar gave good results.

3308. Oscos, M. N.
Estación Experimental de Cinco Saltos. **(The Cinco Saltos Experimental Station.)**
Idia, 1956, Nos. 106/8, pp. 272-3.

Codling moth control programmes have been devised from detailed studies of the biology of the pest. In general DDT has given even better control than lead arsenate or organic phosphorus insecticides, all being highly effective. Both codling moth and *Bryobia praetiosa* were controlled on apple by organic phosphorus preparations or with malathion+DDT, but the bagworm (*Oiketicus kirbyi*) was much more resistant.

3309. Tadić, M.
Jabučni smotavac. **(Biology of the codling moth as a basis for its control.)** [English summary 6 pp.]
Posebna Izd. Inst. Zašt. Bilja **4**, 1957, pp. 100, bibl. 135, illus.

A detailed description of the life history of codling moth in Yugoslavia is followed by recommendations on control methods which are roughly as follows: (1) Prune regularly, thus allowing for better penetration of insecticides. (2) Use an effective insecticide. Pantakan [a local product] was superior to lead arsenate in Yugoslavia. (3) Note that winter spraying with carbolineums has no effect on caterpillars in cocoons. (4) In poor years, when spraying is not worth while, remove the few fruits on the tree to prevent the insect's development. (5) Use trapbands and replace fortnightly up to the time when the 1st generation caterpillars have cocooned. (6) In preparing β-naphthol bands 750 g. β-naphthol + 21 g. lubricant should suffice. (7) Use net traps formed from corrugated paper and wire nets which allow the entry of the caterpillars but not the emergence of moths.

3310. (Giunchi, P.)
La ricomparsa minacciosa della *Cydia molesta* e la recente sperimentazione nei vari metodi di lotta. **(The disturbing reappearance of *Cydia molesta* and recent experiments on various control methods.)**
Inf. fitopat., 1957, **7**: 61-4, illus.

A treatment of peach trees in July with parathion, followed by one in August with TEPP, gave slightly less control than 3 treatments with DDT+parathion, but the difference in cost was so great that 4 parathion treatments or 3 parathion+1 TEPP cost less than a single treatment in which the parathion was mixed with either DDT, DDT+lindane or DDT+malathion. A further reason for omitting chlorinated compounds was their greater toxicity to useful insects.

3311. Sekiguchi, A.
Studies on the control of peach fruit moth by the entomogenous fungus *Isaria fumosorosea* Wize. I. Identification of the fungus and its pathogenicity. [Japanese, with English summary 8 lines.]
Reprinted from *Reps Tohoku nat. agric. Exp. Stat.* **4**, 1955, pp. 152-3, bibl. 5.

Many pupae of peach fruit moth (*Carposina niponsis*) were found to be parasitized by the fungus *Isaria fumosorosea*. It is suggested that the fungus may be used for moth control in the orchard.

3312. Stafford, E. M., and Jensen, F. L.
Grape leaf folder.
Calif. Agric., 1957, **11**(6): 4, 8, 10, 15.

Among insecticides tested against the grape leaf folder [*Desmia funeralis*] in California none gave complete control, but relatively good results were obtained with lead arsenate sprays against first-brood larvae and parathion dusts against second- and third-brood larvae.—Univ. Calif., Davis.

3313. Michelbacher, A. E., and Ross, N.
Navel orangeworm.
Calif. Agric., 1957, **11**(7): 12.

Investigation shows that the navel orangeworm [*Myelois vinipars*] cannot penetrate sound, green husks of walnuts but can enter nuts damaged by codling moth. The more effective the control of codling moth with DDT, the smaller was the infestation of orangeworms.—Univ. Calif., Berkeley.

3314. Vasiljević, L. A.
Patogeno dejstvo nekih vrsta bakterija na dudovca (*Hyphantria cunea* Drury). **(Pathogenic effect of some species of bacteria on the fall webworm (*Hyphantria cunea*, Drury.)** [English summary 8 pp.]
Posebna Izd. Inst. Zašt. Bilja **7**, 1957, pp. 78, bibl. 75, illus.

For the biological control of fall webworm 11 species of bacteria pathogenic to insects were tested. Three species, i.e. a *Bacillus* isolated from *Cicada plebeia*, *B. cereus* var. *alesti* from silk worm and *B. thuringensis* from *Ephestia kühniella*, were found to give 100% kill of caterpillars in the laboratory. In field trials spraying a suspension of the *Bacillus* isolated from *C. plebeia* gave 100% kill of fourth instar caterpillars on apple, sweet and sour cherry, and mulberry trees.

3315. Guillemenet, R., and Roche, R.
Le sphinx de la vigne (*Celerio livornica* Esp.) dans la Province de Casablanca en 1956. **(Vine hawk moth in Casablanca province in 1956.)**
Progr. agric. vitic., 1957, **147**: 338-46, bibl. 4, illus.

In Morocco damage by *Celerio livornica* was very severe in 1956. Lead arsenate was the most effective of the sprays tested, resulting in high caterpillar mortality. A certain amount of protection was obtained with rotenone, chlordane and parathion sprays. [See also *H.A.*, 27: 2319.]

3316. Monti, L.
I microlepidotteri minatori delle foglie del melo nel bolognese. **(Leaf-mining Microlepidoptera of apple trees in Bolonga.)**
Inf. fitopat., 1957, **7**: 78-9, illus.

Leucoptera (*Cemiostoma*) *scitella*, pupating on the trunks, is controlled by winter oil treatment followed by spring and summer spraying with phosphoric esters. *Nepticula malella*, pupating in soil, is controlled with difficulty by successive treatments with a mixture of DDT and phosphoric esters against the prolonged emergence of adults, larvae in the leaves being resistant to phosphoric esters and even to systemic insecticides.

3317. Mori, P.
Osservazioni biologiche e prove di lotta estiva sulla *Leucoptera* (=*Cemiostoma*) *scitella* Zell. nel Veronese. **(Biological observations and experiments on summer control of *Leucoptera* (=*Cemiostoma*) *scitella* in Verona.)** [English summary 9 lines.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 189-96, bibl. 6, illus.

Excellent control of larvae was achieved by spraying apple and pear trees in late August with mixtures of 0·2% lindane and 0·1–0·15% phosphoric esters. These left unpleasant flavours if used too near harvesting, and so for late treatment mixtures of DDT and phosphoric esters were preferable, although less effective. The recommended quantities per hl. of water are (in decreasing order of effectiveness): (1) 20–30 g. of lindane + an equal amount of coumarin phosphoric ester; (2) 25 g. of lindane + 30 g. of parathion; (3) 90–120 g. of DDT + 40 g. of parathion.

3318. Baggiolini, M.
Observations sur l'activité de la tordeuse de la pelure (*Capua reticulana* Hb.=*Adoxophyes orana* F.R.) en Suisse romande. **(Studies on the activity of the summer fruit tortricid in French Switzerland.)**
Rev. romande Agric. Vitic., 1957, **13**: 44-6, bibl. 6, illus.

The life history of, and damage caused by, the summer fruit tortricid are described. Mild attacks of the pest may be well controlled by winter oil sprays, or by preblossom sprays of parathion. For severe infestations a preventive spray of a contact insecticide should be applied about the end of June.—Stat. fed. Essais agric., Lausanne.

3319. Vogel, W., Klingler, J., and Wildbolz, T.
Pamene rhediella Clerck, der Bodenseewickler, ein bisher übersehener Obstschädling. **(*Pamene rhediella*, a fruit pest overlooked in the past.)**
Reprinted from *Mitt. schweiz. ent. Ges.*, 1956, **29**: 283-302, bibl. 16, illus.

Pamene rhediella has been found frequently on fruit trees in central Switzerland and adjacent areas. The biology of the new pest and the injury it causes to apple fruits are discussed. Spraying with a stomach poison or phosphoric ester immediately after blossoming is recommended for control in years of high incidence.—Wädenswil.

3320. Vasseur, R., Schvester, D., and Bianchi, H.
Observations sur les traitements en cours de végétation contre le pou de San José (*Quadraspidiotus perniciosus* Comst.). **(Observations on treatments during full growth against San José scale.)**
Ann. Épiphyt., 1957, **8**: 101-10, bibl. 9, illus.

The effect of mineral oils for control of San José scale, applied to young apple and pear trees, was improved by the inclusion of DDT or parathion. Both mixtures were persistent and caused high mortality. The effect of the mineral oil plus DDT mixtures was modified by climatic and biological conditions, whereas oleoparathion sprays were much less affected.—Stat. exp. Arboric. fruit., Saint-Genis-Laval (Rhône).

3321. Lanchester, H. P., and Dean, F. P.
Control of San José scale on fruit trees during the prebloom period of pears.
J. econ. Ent., 1957, **50**: 14-15, bibl. 5, illus.

From tests conducted over 3 years it appears that 1 lb. of 25% parathion w.p. per 100 gal. will control San José scale on pears and other tree fruits, if applied in the period 2 weeks prior to the pink bud stage of pear trees. At this time aphids and pear psylla may also be controlled by such an application.—Ent. Res. Branch, U.S.D.A.

3322. Tomlinson, W. E., Jr.
***Eriococcus azaleae* Comst. and *Cerococcus kalmiae* Ferris on cranberry.**
J. econ. Ent., 1957, **50**: 113-14, bibl. 1, illus.

While often occurring together, the azalea bark scale, *Eriococcus azaleae*, has been much less important recently on cranberries in Massachusetts than *Cero-*

coccus kalmiae. Nearly perfect control of *C. kalmiae* was obtained in 1953 with emulsifiable concentrates of 45% EPN, 33·3% Metacide and 57% malathion each at 1–800, and 15% parathion w.p. at 2 lb. in 100 gal.—Cranberry Stat., Univ. Mass.

3323. FLANDERS, S. E.
Fig scale parasites introduced into California.
J. econ. Ent., 1957, **50**: 171-2, bibl. 5.

A European form of *Aphytis mytilaspidis*, introduced in 1949, caused a marked reduction in the density of the fig scale, *Lepidosaphes ficus*, in certain orchards.—Univ. Calif. Citrus Exp. Stat., Riverside.

Other pests.

(*See also* 3337v, 3338i.)

3324. LANGEDIJK, G., AND WEGENAAR, C.
De kunstsperwer als spreeuwenverjager. **(The artificial sparrowhawk as a starling scarer.)**
Fruitteelt, 1957, **47**: 534-5, illus.

The use of the bird scarer developed by the Instituut voor Tuinbouwtechniek in Wageningen [see *H.A.*, 24: 3662] has given promising results in growers' cherry orchards.

3325. VAN WIJNGAARDEN, A.
Insecticiden of biologische maatregelen tegen de veldmuis, *Microtus arvalis* (Pallas), in de fruitteelt. **(Insecticides or biological measures against the continental vole, *Microtus arvalis*, in fruit growing.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1957, **20**: 369-74, bibl. 15, illus.

Three methods of controlling the continental vole are discussed. (1) Poisoning with zinc phosphide or pyrimidine wheat is not practicable owing to the high labour requirements. (2) Insecticidal sprays with endrin or toxaphene on a large scale are dangerous owing to toxicity to other mammals. (3) It has been observed that *Microtus* will not infest regularly mowed and browsed meadows; it is suggested that this may be applicable to control in orchards.

Sprays and spraying.

(*See also* 3337p, r, u, w, x, 3338e, 3605a.)

3326. QUEBEC, PLANT PROTECTION BUREAU.
Spray guide for apple trees, 1957. [In French and English.]
Plant Protection Bureau, Quebec, 1957, 1 folded sheet.

A guide allowing for 1 preblossom, 1 blossom, 1 calyx, 4 cover and 2 special sprays, the last about 5 August, and for the use of the following materials: Captan, glyodin, dichlone, malathion, dieldrin or methoxychlor, ferbam, DDD, DDT, lead arsenate, ryania and ovotran. Hints are given on application and of special treatment for the elimination of particular phenomena.

3327. MURPHY CHEMICAL COMPANY LIMITED.
Murphy low volume spraying conferences.
Murphy Chemical Company Limited, Wheathampstead, Herts., 1957, pp. 70.

Papers read at 3 conferences on low volume spraying, held at the end of 1956, by delegates from research stations, spraying machinery manufacturers and the NAAS. [For papers read at one of these conferences see *H.A.*, 27: 345.]

3328. CERCÓS, A. P.
Bacilomicina y tomatina en la lucha contra fitopatógenos. **(Bacillomycin and tomatine for control of plant pathogens.)**
Idia, 1956, Nos. 106/8, pp. 44-5.

Bacillomycin at concentrations of 1 : 1,000 to 1 : 100,000 had only a slight inhibitory effect on apple scab and peach leaf curl. The antibiotic action of tomatine, extracted from tomato, *in vitro* on various fungal pathogens of plants, could not be reproduced *in vivo*.

3329. TSAO, P. H.-T.
A search for antibiotics that act systemically in plants.
Diss. Abstr., 1956, **16**: 2011, being *Publ.* 19,148 of 68 pp.

Work is described on a method of using detached leaflets of tomato in screening antibiotics, and on an antifungal antibiotic, B74, which has shown promise against early blight (*Alternaria solani*) on greenhouse grown tomatoes.—Univ. Wis.

3330. BARBERÁ GAYOSO, C.
Fungicidas acúpricos en viticultura. **(Non-copper fungicides in viticulture.)**
Rev. Inst. agríc. catal., 1957, **106**: 95-102.

Physiology of action of dithiocarbamates, rapid decomposition of organic fungicides in general and their tendency to advance leaf-fall, the use of copperized zineb and details of the main and subsidiary effects of captan are discussed. These last include systemic translocation, healing of hailstone wounds (effecting indirect control of *Coniothyrium*) and the inducement of uniformity in seed size. Karathane is mentioned as an alternative to sulphur for powdery mildew control.

3331. LLEWELYN, F. W. M.
The scorching of apple leaves by copper sulphate.
Ann. appl. Biol., 1957, **45**: 376-84, bibl. 9.

A method of measuring scorch induced deliberately in apple leaves is described and its value discussed. The method was used to study the action of copper sulphate sprays and it was shown that the leaves of apple varieties tested were most susceptible to copper damage at the end of May. The variation in susceptibility between varieties, between orchards and from day to day is reported. The rootstock, whether vigorous or dwarfing, was found to have no influence upon the susceptibility of the scion to copper sulphate damage. —E. Malling Res. Stat. [See also *H.A.*, 27: 2325.]
J.R.L.

3332. O'NEILL, W. J., AND KINNEY, J. R.
Kelthane (FW-293), an acaricide with exceptionally great promise for deciduous fruits.
Proc. Wash. St. hort. Ass., 1956, pp. 20-1.

Emulsion concentrates of Kelthane seemed to injure foliage or fruit but wettable powders did not injure the apple varieties on which they were tried, except possibly Golden Delicious [see also *H.A.*, 26: 2620]. The material applied at 1½ lb. per 100 gal. in 2 cover sprays gave better control of European, two-spotted and rust mites than Aramite or Sulphenone.

3333. Heikinheimo, O.
Sisävaikutteisista eli systeemisistä aineista tuhoeläinten torjunnassa. (**Systemic insecticides used in pest control.**) [English summary 21 lines.]
Reprinted from *Maatalous ja Koetim*, 1954, vol. **8**, pp. 9.

A detailed account is given [in Finnish] of schradan, Isopestox and demeton, and of their properties, toxicity, mode of action, etc. The usefulness of Systox against fruit tree red spider (*Metatetranychus ulmi*), hawthorn psylla (*P. peregrina*) and apple sucker (*P. mali*) is noted.

3334. Haynes, H. L., Lambrech, J. A., and Moorefield, H. H.
Insecticidal properties and characteristics of 1-naphthyl *N*-methylcarbamate.
Contr. Boyce Thompson Inst., 1957, **18**: 507-13, bibl. 9.

1-Naphthyl *N*-methylcarbamate, representative of a new group of insecticidal carbamates and designated Sevin, has been synthesized and tested as an insecticide. It was found highly effective against a wide range of fruit and vegetable pests, including resistant strains of codling moth, but not against mites. It was compatible with all other pesticides tested, had moderate residual properties and some systemic effects, was not phytotoxic at medium or high rates, and had low mammalian toxicity.

3335. Barr, H. E., Clark, P. J., and Jacks, H.
Determination of tetramethyl thiuram disulphide and dimethyldithiocarbamate spray residues on apples.
N.Z. J. Sci. Tech. Sect. B., 1957, **38**: 425-32, bibl. 9.

The micro method described will detect 0·1 p.p.m. of fungicide. Residues of these fungicides were determined on apples that had received different numbers of sprays of different strengths. The amounts found did not exceed the tolerance limits as allowed in U.S.A. The highest residues were obtained from fruit that had received summer oil sprays between thiram or ferbam applications. [From authors' summary.]—D.S.I.R., Wellington and Auckland.

3336. Tietz, H.
Studies om Metasystox residues, 1956.
Höfchen Briefe (English edition), 1956, **9**: 286-8.

The technique of testing for residues is described and results are given from tests made at various intervals after spraying vines, strawberries, black currants, melons, hops and peas. Residues were sufficiently low 8–10 days after the last spraying for the edible produce to be harmless for human consumption. [See also *H.A.*, 27: 346z.]

Noted.

3337.

a Afanasiev, M. M., and Mills, I. K.
The spread of Lambert mottle virosis in Lambert and Peerless varieties of sweet cherries in Montana.
Plant Dis. Reptr, 1957, **41**: 517-20, bibl. 3.

b Agulhon, R., and Amphoux, M.
Essais de lutte contre la pourriture grise. (**Tests for botrytis control.**)
Progr. agric. vitic., 1957, **148**: 13-18.
Unsatisfactory results with 3 September applications of various fungicides to 2 grape varieties.

c Brian, P. W.
Effects of antibiotics on plants.
Annu. Rev. Plant Physiol., 1957, **8**: 413-26, bibl. 129.
A review.

d Bulit, J.
Contribution a l'étude biologique du *Nectria galligena* Bres., agent du chancre du pommier. (**A contribution to the biological study of *Nectria galligena*, causing apple canker.**)
Ann. Épiphyt., 1957, **8**: 67-89, bibl. 18.
Principles of control are discussed.

e Cochran, L. C., and Calavan, E. C.
Apricot ring pox virus not transmitted through apricot seeds.
Plant Dis. Reptr, 1957, **41**: 690, bibl. 4.

f Crüger, G.
Untersuchungen über die Bedeutung von Diffusion und Adsorption für eine Bodenbegasung mit Chlorpikrin. (**Studies on the importance of diffusion and adsorption in soil fumigation with chloropicrin.**) [English summary ½ p.]
Gartenbauwiss., 1956, **21**: 445-85, bib. 59, illus.

g Cunningham, G. H., and Atkinson, J. D.
Certification of therapeutants and plant hormones.
Inf. Ser. N.Z. Dep. sci. industr. Res. **13**, 1956, pp. 21.
A list of certified products, giving trade name, manufacturer or agent, and use.

h Fernández Valiela, M. V., and Bakarcic, M.
Escaldadura del borde de las hojas del ciruelo. (**Marginal leaf scald of plums.**)
Idia, 1956, Nos. 106/8, pp. 184-5.
The virus nature of the disease was confirmed. Varieties differ in susceptibility.

i Fogliani, G.
La selezione clonale ai fini della profilassi nei vivai di viti. (**Clonal selection for disease resistance in vine nurseries.**)
Bull. Agric. 1956, No. 16, repr. as *Publ. Ist. Patol. veg. Univ. Milano* (Racc. 5), pp. 11, bibl. 11.
Current Italian studies on infectious degeneration outlined.

j Fulton, J. P.
Aster yellows virus affecting strawberries in Arkansas.
Plant Dis. Reptr, 1957, **41**: 521-3, bibl. 8, illus.
"August black root" or "spot dying" was shown to be caused by the aster yellows virus.

k Gjaerum, H. B.
Forsøk med nye kjemiske midler mot stikkelsbaerdreper. **(Tests with new chemicals for the control of American gooseberry mildew.)**
Frukt og Baer, 1957, **10**: 43-4.
Karathane proved effective without causing spray damage.

l Goffart, H.
Der gegenwärtige Stand der Nematodenbekämpfung mit chemischen Mitteln. **(The present status of chemical control of nematodes.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1957, **9**: 75-8, bibl. 20.
Soil fumigants.

m Govi, G.
La ticchiolatura delle pomacee. **(Apple and pear scab.)**
Inf. fitopat., 1957, **7**: 94-104, illus.
A review, mainly of apple scab control with zineb, captan, phenyl-mercuric products and TMTD.

n Hirst, J. M.
A simplified surface-wetness recorder.
Plant Path., 1957, **6**: 57-61, bibl. 4, illus.
For timing sprays against apple scab, etc.

o Hockey, J. F.
Virus diseases of apples.
A.R. N. Scotia Fruit Grs' Ass. 1955, pp. 121-3.
Descriptions of mosaic, false sting and flat limb.

p van Kleffens, E. J., and Wegenaar, C.
Rugnevelspuit. **(Knapsack mist sprayer.)**
Beproevingsrapport I.T.T. Wageningen **20/6304**, 1956, pp. 14, illus.
Tests with a German make, "Blasator".

q Krythe, J. M.
Tien jaren onderzoek over de bestrijding van appelmeeldauw (*Podosphaera leucotricha* Salm.). **(Ten years' study on apple mildew control.)**
Reprinted from *Landbouwdocumentatie*, 1955, **11**(53): 1-7, bibl. 19.

r Kundert, J., and Zwicky, P.
Prüfung neuer Spritzverfahren im Weinbau. **(Spray testing in the vineyard.)** [English, French and Spanish summaries, 5–6 lines each.]
Mitt. Klosterneuburg, Ser. A, 1957, **7**: 115-22, bibl. 2.
By the use of a high pressure spray at 60 atm. it was found possible to spray effectively 14 rows of vines 1 m. apart.

s Majeríková-Hlaváčková, J.
Lišejníky ovocných stromů. **(Lichens on fruit trees.)** [Russian, English and German summaries ¾ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 141-56, bibl. 12, illus.
For control scraping the bark and repeated spraying with a mixture of carbolineum and organic dyes (dinitroorthocresol) is recommended.

t Ministry of Agriculture, London.
Fruit tree red spider mite.
Adv. Leafl. Minist. Agric. Lond. **10**, revised 1957, pp. 4.
Metatetranychus ulmi.

u van den Muijzenberg, E. W. B.
Mistblowing in orchards in the Netherlands.
Outlook on Agric., 1957, **1**: 162-4.
A review.

v Pfeifer, R. P.
Improvements in the bird-control apparatus for experimental plots.
Agron. J., 1957, **49**: 338.
Electrified wires [see *H.A.*, 26: 2671i] were fitted with electric supply to transformer, permitting use of time clock.

w Plantenziektenkundige Dienst, Wageningen.
Bestrijding van plantenziekten, schadelijke dieren en onkruiden in de landbouw (Receptenboek). **(Control of diseases, pests and weeds in agriculture. (Instruction book.)**
Meded. PlZiekt. Dienst **116**, 4th edition, revised 1957, pp. 121, f. 1.50.
Methods and materials. For 2nd and 3rd editions see *H.A.*, 22: 3763 and 25: 3808b.

x Powell, D., Chandler, S. C., and Owen, F. W.
Pest control in commercial fruit plantings.
Circ. Ill. Coll. Agric. **767**, 1957, pp. 40, illus.

y Ramsfjell, T.
Virussjukdommer på frukttraer. **(Virus diseases of fruit trees.)**
Frukt og Baer, 1957, **10**: 64-76, bibl. 11, illus.
A review.

z Ridé, —., and Bulit, J.
La chancre bactérien (*Pseudomonas mors prunorum* Worm.) et les dépérissements du cerisier en France. **(Bacterial canker and the dying back of cherry trees in France.)**
C.R. Acad. Agric. Fr., 1957, **43**: 262-4.
Bacterial canker, which is new to France, and other causes of die-back discussed with suggestions for control.

3338.

a Roche, R.
Au vignoble: mildiou et oïdium. **(Downy and powdery mildews in the vineyard.)**
Terre maroc., 1957, **31**: 162-4.
Advice to Moroccan growers on timing of treatments, mainly those with sulphur. [See also *H.A.*, 27: 2295.]

b Rorie, F. G.
Resolution of certain strawberry viruses by the aphid vector *Capitophorus minor* Forbes.
Plant Dis. Reptr, 1957, **41**: 683-9, bibl. 9, illus.

c SANDVOSS, H.
Gallen an Pflaumen und Johannisbeeren sowie deren Erreger. (Galls on plums and currants and their origin.)
Dtsch. Gartenb., 1957, **4**: 129-31, bibl. 8, illus.
Gall mite damage and control.

d SCARAMUZZI, G., AND TUCCI, S.
Rassegna bibliografica delle principali malattie delle piante coltivate a tutt'oggi segnalate in Puglia. **(Bibliographical review of the chief diseases of cultivated plants so far reported in Apulia.)** [English summary 4 lines.]
Ann. Sper. agrar., 1957, **11**(2), Suppl. pp. CXLIX–CC, bibls extensive.
Including fruits, vegetables, tobacco and ornamentals.

e STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR.
Specialpraeparater anerkendte af Statens Forsøgsvirksomhed i Plantekultur til bekaempelse af plantesygdomme og skadedyr gyldig for året 1957. **(Preparations approved by Statens Forsøgsvirksomhed i Plantekultur for the control of plant diseases and pests in 1957.)**
Copenhagen, 1957, pp. 42.
The chemical analysis is given of each material.

f VARNEY, E. H.
Mosaic and shoestring virus diseases of cultivated blueberry in New Jersey.
Phytopathology, 1957, **47**: 307-9, bibl. 2, illus.

g VIDAL, J. P.
La lutte contre le mildiou de la vigne. **(Control of downy mildew of vines.)**
Terre maroc., 1957, **31**: 114-15.
Experience with captan and zineb, alone and mixed with copper salts, discussed.

h WISHART, R. L.
Apricot gummosis.
J. Dep. Agric. S. Aust., 1957, **60**: 359-60, bibl. 4.
Control recommendations repeated [see *H.A.*, 26: 341 and 3598x] with plea to growers to use them.

i WOLFE, H. R.
Control of mice in Washington orchards.
Proc. Wash. St. hort. Ass., 1956, pp. 60, 62, 64-6.
Mainly by zinc-phosphide-treated baits.

WEEDS AND WEED CONTROL.

Herbicides and their application.

(*See also* 3037, 3089g, 3220, 3337w, 3407a, b, g, h, j, l, m, o-s, 3605a.)

3339. FRYER, J. D., AND CHANCELLOR, R. J.
The relative toxicity of MCPA, MCPB, 2,4-D and 2,4-DB to weeds.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 357-77, bibl. 3.

A brief description of the results of 60 field experiments and a consideration of some factors which affect the interpretation of the results, e.g. type of assessment (kill, height, vigour), time of assessment, lack of parallelism between dose response curves. A histogram and table compare the effects of the 4 compounds on 24 species.—*Weed Abstr.*, **6**, No. 592.

3340. CURTIS, O. F.
Influence of herbicides and fertilizers on stump decay.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 293-9, bibl. 4.

Stumps of apple and pear trees were treated with Ammate (80% ammonium sulphamate) 40–120 g./stump, or 2,4-D+2,4,5-T at 7 lb. per 100 gal. in oil. Various fertilizer applications were then repeated over a 3-year period during which resistance of the stumps to mechanical breakage and penetration was rated. Moderate applications of nitrogen salts with phosphate promoted softening of the stumps, but the heaviest rates had a preservative effect. Unless phosphate was included, nitrogen alone had no measurable effect on softening. The herbicides also tended to hasten softening.—*Weed Abstr.*, **6**, No. 1022.

3341. BRACEY, P.
Farm trials with 2,4-DES alone and in combination with other herbicides for the control of weeds in horticultural crops.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 673-80.

This summary of a more detailed paper gives numerous recommendations for the use of 2,4-DES in vegetables, perennial flowers, woody ornamentals and some fruit crops.—From *Weed Abstr.*, **6**, No. 503.

3342. KEAYS, J. W., AND ZEDLER, R. J.
A new herbicide, soil fungicide and nematocide called Mylone.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 58-64.

'Crag Mylone' 85W is 3,5-dimethyltetrahydro-1,3,5-thiadiazine-2-thione, a white crystalline solid formulated as an 85% wettable powder. It may be applied dry with a fertilizer or suspended in water as a drench or spray. It is a temporary soil sterilant; most crops can be planted 2-3 weeks after treatment without harm. Laboratory and field trials indicate that the chemical will control most annual and perennial weeds, certain nematodes, soil fungi and soil insects. It should be further tested as a pre-planting treatment in tobacco, vegetable and conifer seed beds, ornamental propagating beds and turf. The effectiveness of Mylone against certain weeds is reported.—From *Weed Abstr.*, **6**, No. 1106. [See also *H.A.*, 26: 3001; 27: 895, 2471.]

3343. Crafts, A. S.
Translocation of herbicides. I. The mechanism of translocation: methods of study with C^{14}-labeled 2,4-D. II. Absorption and translocation of 2,4-D by wild morning-glory.
Leonard, O. A., and Crafts, A. S.
***Idem* III. Uptake and distribution of radioactive 2,4-D by brush species.**
Hilgardia, 1956, **26**: 287-334, bibl. 30, illus.; 335-66, bibl. 14, illus.; and 366-415, bibl. 9, illus.

I. Trials confirm earlier conclusions that 2,4-D permeates the cuticle of sprayed leaves, migrates to the phloem and is transported in this tissue, along with food materials in the plant.

II. The work emphasizes the importance of formulation. Emulsifiable acid and heavy ester formulations are proving better than salts and light esters.

III. These trials show that 2,4-D may move in evergreen species for some months. They stress the importance of soil moisture and root growth to 2,4-D transport and response, and finally they show that different brush species need different treatment and that a single application is unlikely to control mixed populations.

3344. Williams, M. C.
Absorption and translocation of 2,4-dichlorophenoxyacetic acid in certain annual dicotyledons.
Diss. Abstr., 1956, **16**: 1771, being *Publ.* 18,211 of 89 pp.

The resistance of 3 weed species (*Xanthium commune*, *Datura stramonium* and *Sicyos angulatus*) to 2,4-D applications was studied. *Xanthium* was very sensitive to 2,4-D, *Datura* was more resistant and *Sicyos* was highly resistant [see also *H.A.*, 26: 3688]. All 3 species were killed at lower concentrations through the roots than through the foliage. It was concluded from absorption and translocation studies that these processes do not bear a direct relationship to herbicidal action by 2,4-D in these 3 species. The determining factor is probably concerned with an internal metabolism or enzyme system peculiar to the species.—Univ. Illinois.

3345. Curtis, O. F.
2,4-D residues in sprayers.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 286-92, bibl. 7.

A biological method for the detection of 2,4-D residues depending on the growth responses of germinating radish seed is described. Various cleaning tests with a knapsack sprayer were carried out. The acid left a greater potential residue than did the sodium salt. It was found that the 2,4-D concentration was more reduced by allowing the sprayer to stand filled with water overnight before giving the final rinses than by giving all the rinses soon after the original 2,4-D had been emptied.—From *Weed Abstr.*, **6**, No. 1085.

Control of aquatic weeds.

3346. Hodgson, J. M.
A method for evaluating the control of water weeds with herbicides.
Weeds, N. York, 1957, **5**: 138-40, bibl. 2.

The construction of an isolation box which can be placed in a ditch to allow a plot of waterweeds to be treated for a given time is described. It was tested on plots of pondweeds. The compounds used in decreasing order of toxicity were orthodichlorobenzene 440 p.p.m., aromatic solvent 640 p.p.m., dehydroabiethylamine acetate 200 p.p.m., a commercial herbicidal oil and 2,3-dichloronaphthoquinone 100 p.p.m. The latter 2 were not effective for control.—*Weed Abstr.*, **6**, No. 793.

3347. Foster, H. S., and Plant, W.
Effect of copper sulphate on aquatic weeds.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 787-91, bibl. 8.

In a pilot experiment copper sulphate was introduced into a stream to give an overall average concentration of approximately 1 p.p.m. for 83 days. The growth of some weeds was inhibited but total weed growth was not materially reduced beyond the first 10–20 yards from the treatment point. Weeds conspicuously absent after treatment were *Ranunculus aquatilis*, *Elodea canadensis*, *Lemna* spp. and algae. Plants completely unaffected included watercress. No ill effects were noted to cattle or poultry which drank the water and no dead fish were observed.—From *Weed Abstr.*, **6**, No. 529.

3348. Schofield, R. C.
Control of weeds in irrigation races.
Proc. 9th N.Z. Weed Control Conf., 1956, pp. 110-14.

A review of the methods of chemical weed control used in New Zealand for various types of waterweeds: (1) Against submerged and partially submerged species, emulsifiable aromatics are used; (2) against grassy and other weeds, monuron, polyborchlorate, TCA and sodium chlorate; and (3) against weeds impeding access, 2,4,5-T and 4-CPA.—From *Weed Abstr.*, **6**, No. 794.

Control of particular species.

(*See also* 3407f.)

3349. Holmes, G. D.
Experiments on the chemical control of *Rhododendron ponticum*.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 723-30.

Various herbicides were tried at various stages of growth over a period of 6 years, and it is concluded that the treatment of freshly cut or coppicing stumps is more practical than basal bark spraying or over-all foliage sprays. Ammonium sulphamate at a minimum of 5 lb./gal. at 25–50 gal./ac. was the most promising treatment.—From *Weed Abstr.*, **6**, No. 545.

3350. Conway, E., and Forrest, J. D.
Chemical treatment of bracken.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 255-68, bibl. 26.

Amino triazole, ammonium sulphamate, MCPA, 2,4-D, 2,4,5-T, 4-CPA, MCPB, 2,4-DB, 2,4,5-TB, 4-CPB, TCA, monuron and MH was applied to *Pteridium aquilinum* in garden and/or field tests. No compound killed the rhizomes.—*Weed Abstr.*, **6**, No. 613.

3351. Naudé, C. P.
Chemical methods of control of jointed cactus bring new hope.
Fmg S. Afr., 1957, **33**(4): 16-21, bibl. 1, illus.

Earlier attempts at control of jointed cactus, *Opuntia aurantiaca*, by mechanical, mechanical-chemical and biological methods were unsuccessful but in more recent trials 2,4,5-T has shown good promise. The best results were obtained with thorough spray application of butyl and amyl esters of 2,4,5-T at 1·5 lb. active ingredient in 10 gal. of paraffin. The treatment was also effective against prickly pear.

Weed control in the orchard and vineyard.

(*See also* 3337s, 3407c, e, n.)

3352. Luckwill, L. C., and Campbell, A. I.
The tolerance of fruit crops to certain selective and pre-emergence herbicides.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 539-42.

The sodium salts of 2,4-DB, MCPA, MCPB, 2,4,5-T, 2,4,5-TB and 4-CPB and the amine salt of 2,4-D were sprayed as 1,000 p.p.m. solutions to run-off on pear (Laxton's Superb and Doyenne du Comice), apple (Cox's and Cheddar Cross), plum (giant prune), blackcurrant (Wellington XXX), red currant (Red Lake) and gooseberry (Whinham's Industry). Negligible to slight damage only was caused by 4-CPB on apple (Cox's), 2,4,5-TB on blackcurrant and 2,4-D, 2,4-DB and MCPB on red currant. It is possible that adverse effects will occur in the succeeding year. 2,4,5-TB was very promising for the control of *Calystegia sepium* in blackcurrants. 2,4-DES 1 and 4 lb./ac., monuron 1 and 4 lb./ac., and CIPC 6 lb./ac. were applied to clean beds of 3-year-old blackcurrants (Mendip Cross). 2,4-DES at both rates and monuron at 1 lb. caused no crop injury; the high rates of monuron and CIPC were most injurious, particularly CIPC. The dominant weeds in the area were *Senecio vulgaris*, *Poa annua*, *Capsella bursa-pastoris*, *Matricaria suaveolens*, *Stellaria media* and *Epilobium angustifolium*; all were controlled for at least 3 months except *S. vulgaris* by CIPC. 2,4-DES applications were made to maiden apple and pear seedlings 2 lb./ac., apple rootstocks 2 and 4 lb./ac., quince C stock 2 and 4 lb./ac., plum stocks (Brompton 2 lb./ac., Mariana 4 lb./ac.), maiden plums (Early Laxton) 2 lb./ac., cherrystock and 3-year seedlings 2 lb./ac. and loganberry layer beds 4 lb./ac.; any damage that occurred was negligible.—*Weed Abstr.*, **6**, No. 511.

3353. Roach, F. A.
The use of 2,4-DES (sodium 2,4-dichlorophenoxyethylsulphate) to control weeds in strawberries.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 687-95, bibl. 4.

Applications of 2,4-DES at 2·5, 5 and 7·5 lb./ac. in August after hoeing did not injure 1-year-old Royal Sovereign strawberry plants. Autumn application to Huxley gave successful control of 3 weeds with no crop damage. Five lb./ac. of the compound applied to 2-year-old Cambridge Prizewinner in April kept all areas comparatively free of weeds until after harvest. Four applications at 5 lb./ac. at monthly intervals to Red Rich had no effect on plants or runner production and gave fairly good control, without any cultivation, of 10 weed species. The number and vigour of runners of Royal Sovereign and Cambridge Prizewinner appeared to be reduced by 2 applications, each at 5 lb./ac., in June and July. The effect of 2,4-DES on strawberry plants was compared with that of 2,4-D, MCPA, 2,4-DB and MCPB.—From *Weed Abstr.*, **6**, No. 510.

3354. Shaulis, N., Nordan, T. D., and Sweet, H.
New York vineyard weed control trials in 1956.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 52-7.

The results of a number of trials in which monuron and diuron were used to control weeds in vineyards are summarized as follows: (1) application is more effective in early spring than early January; (2) *Convolvulus sepium* is resistant to both compounds and there is a danger of increasing the problem by killing other weeds; (3) monuron at 4 lb./ac. was effective against chickweed (*Stellaria media*) or annual bluegrass (*Poa annua*); (4) on light soil monuron at 4–8 lb./ac. controlled rye grass (*Lolium* spp.), quackgrass (*Agropyron repens*) and orchard grass (*Dactylis glomerata*); (5) dandelion (*Taraxacum officinale*), wild carrot (*Daucus carota*), horse nettle (*Solanum carolinense*) and broadleaf dock (*Rumex obtusifolius*) are resistant to monuron and diuron.—*Weed Abstr.*, **6**, No. 1036.

Weed control in ornamentals.

3355. Pridham, A. M. S.
Granular *versus* miscible CIPC in relation to crop and weed growth in *Chrysanthemum morifolium*.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 76-9.

Granular formulations of CIPC 16 lb./ac. did not decrease the growth of chrysanthemums but miscible formulations at this rate definitely reduced growth. *Agrostis alba* sown as an indicator crop was controlled by the granular formulations. Residual action of CIPC was greater under top watering than when sub-irrigation was applied. Endothal 1·5 lb./ac. did not affect chrysanthemum growth but did reduce the growth of *Senecio vulgaris*.—*Weed Abstr.*, **6**, No. 1035.

3356. Mimaud, J.
Une application de désinfection du sol par la chaleur: la destruction de l'oxalis tubéreux. **(An application of soil disinfection by steaming: destruction of tuberous oxalis.)**
Phytoma, 1957, No. 86, pp. 17-19, from abstr. in *Soils and Ferts*, 1957, **20**, abstr. 1431.

Steam injection for 15–20 min. to obtain 80–85° C. temperature to 30-cm. depth successfully destroyed *Oxalis floribunda* invading beds of azalea. The latter benefited from the increased N supply following sterilization.

3357. Ticknor, R. L., and Bobula, P. F.
Chemical weed control in rhododendrons.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 65-8, bibl. 1.

The following herbicides were applied twice during the season (June 14th and August 3rd) to weed-free soil in plots of 4- and 10-year-old *Rhododendron catawbiense*: Alanap-3 [NPA] 6 lb./ac., Alanap-3 3 lb./ac.+2,4-DES 3 lb./ac., 2,4-DES 10 lb./ac., monuron 0·5 and 1·0 lb./ac., diuron 0·5 and 1·0 lb./ac. and CIPC 4 and 6 lb./ac. Monuron and diuron continued to give the most satisfactory weed control without injury to the crop. Data are given on the effects of these herbicides on grasses, *Stellaria media*, *Lamium amplexicaule*, *Mollugo verticillata*, and *Portulaca oleracea*.—*Weed Abstr.*, **6**, No. 998.

3358. Pridham, A. M. S.
Granular *versus* miscible CIPC in relation to crop and weed growth in *Rosa dilecta* variety Miss Liberty.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 73-5.

Granular formulations of CIPC were compared with spray treatment when applied at 8, 12 and 16 lb./ac. to *Rosa dilecta* (1) as dormant plants at planting, (2) during first flush of growth, (3) at time of mature growth in early August. Estimations were based on weight of rose tops in October and on germination and growth of redtop (*Agrostis alba*) which was sown prior to application. Granular formulations of CIPC at 16 lb./ac. did not harm newly planted roses as indicated by green weight of top growth or by number of new shoots per plant. Miscible formulations caused a reduction in growth when applied as overall sprays during the early stages of growth, but less damage occurred from directional basal application to mature plants. All redtop was eliminated in all treated plots. —*Weed Abstr.*, **6**, No. 1017.

3359. Ticknor, R. L., and Bobula, P. F.
Chemical weed control in miscellaneous nursery stock.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 69-72, bibl. 2.

Alanap-3 [NPA]+2,4-DES each at 2 and 4 lb./ac., monuron 0·5 and 1 lb./ac., CIPC 4 and 6 lb./ac. were applied as directed sprays to rows of spreading cotoneaster (*Cotoneaster divaricata*), Pfitzer's juniper (*Juniperus chinensis pfitzeriana*) and Japanese yew (*Taxus cuspidata*). Numerical ratings for *Stellaria media*, *Lamium amplexicaule*, *Mollugo verticillata* and *Portulaca oleracea* are given. Early applications (May) of Alanap-3+2,4-DES gave better control than applications in July and September. CIPC 6 lb./ac. was effective on all dates; it did not control *L. amplexicaule*, but was the most effective herbicide for *P. oleracea*. Monuron 0·5 and 1 lb./ac. was the only compound which produced visible injury to *Ilex crenata convexa*.—*Weed Abstr.*, **6**, No. 997.

3360. Bylterud, A.
Chemical weed control in Norwegian ornamental nurseries.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 731-43.

Results are given of trials carried out during 1954–1955 with NPA, 2,4-DES, MCPES, monuron, propham and CIPC on nursery stock of some 20 species of trees and shrubs. Monuron was the best weedkiller but also most toxic to the ornamentals.—From *Weed Abstr.*, **6**, No. 521.

3361. Woltz, S. S.
Chemical weed control for gladiolus.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 549-55, bibl. 9.

In 3 years' trials on the variety Snow Princess several herbicides successfully controlled weeds, other than nutgrass and Bermuda grass, with little or no reduction in the value of the flower crop as compared with hoeing. The herbicides did, however, reduce the number of corms produced especially in the third season. From the results so far obtained the following herbicide treatments are recommended for the sandy soils of Florida: (A) Oktone (octochloro-cyclohexenone) for pre-emergence application to both corms and cormels at 8 lb. active ingredient in 20 to 40 gal. mineral spirits per acre. (B) Crag 1 [2,4-DES] for pre- and directed post-emergence application to corms, but not cormels, at 3 to 4 lb. active ingredient in 50 to 100 gal. water per acre treated. A combination of Crag 1 and Chloro IPC [CIPC], though promising, is not yet recommended for commercial use.—Gulf Coast Exp. Stat., Bradenton, Fla.

3362. Anon.
Chemische Unkrautbekämpfung bei Gladiolen. **(Chemical weed control in gladioli.)**
Gartenwelt, 1957, **57**: 150, illus.

In plots of gladiolus Prevenol 56 (pre-emergence application) and BNP 30 (applied when the plants were 5–6 cm. high) both gave good weed control at reasonable cost and with only slight phytotoxicity.

3363. Wood, J., and Howick, S. J.
Experiments with pre-emergence weedkillers on beds of narcissus and tulip 1953-56.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 697-701, bibl. 3.

Three experiments are described in which TCA 10 and 20 lb./ac., CIPC 4 and 8 lb./ac., CMU 4 lb./ac., DNC 12 lb./ac., dinoseb 8 lb./ac., sodium arsenite (98% As_2O_3) 1 gal./ac., white oil 8 gal./ac., sulphuric acid 12·5%±cultivation and PCP 16 lb./ac.±cultivation were applied pre-emergence to some varieties of tulips and narcissus. CIPC and PCP were the most promising treatments. CMU caused severe injury to tulips but not always to narcissus. Although weed control with DNC and dinoseb was good the crop never looked well. Narcissus bulbs treated with TCA in 1953 still produced malformed flowers in April 1956.—*Weed Abstr.*, **6**, No. 499.

Weed control in tropical crops.

3364. Cibes, H. R.
The control of weeds in pineapple fields with CMU. [Spanish summary ½ p.]
J. Agric. Univ. P.R., 1957, **41**: 11-19, bibl. 2, illus.

In two experiments CMU [monuron] was applied to Smooth Cayenne pineapple plots at rates of 2, 4 and 6 lb. per acre in 100 gal. water, no attempt being made to avoid spraying the pineapple plants. In the first experiment the treatment was applied 1 month after planting, and in the second 6 months after planting and again 3 months later. In both trials all three concentrations were equally effective in controlling weeds, predominantly *Cynodon dactylon* and *Digitaria sanguinalis*, for 3 months. None of the treatments injured the pineapples.

3365. KROLL, U.
Work with herbicides in pyrethrum.
Paper read at E. Afr. Herbicides Conf., 1957, pp. 3.

Chloroxone (2,4-D) has been used without injury to pyrethrum, whereas 2,4-D (butyl) at 2 lb./ac. killed some plants. Seedlings of *Spergula arvensis*, *Amaranthus* sp., *Sonchus asper*, *Silene gallica*, *Oxalis* sp., *Tagetes minuta* and *Bidens pilosa* were killed by 2,4-D (butyl) at 0·5 lb./ac. MCPA was much less toxic to the crop than 2,4-D. Over several seasons TCA 5–30 lb./ac. was non-injurious. PCP and DNC appear too damaging to use. Oils at up to 80 gal./ac. did not affect pyrethrum. MH 2–16 lb./ac. and fenuron 4–32 lb./ac. had little effect on *Pennisetum clandestinum* and *Digitaria scalarum*.—*Weed Abstr.*, **6**, No. 788.

3366. VAN DER LINDE VAN SPRANKHUIZEN, J. C., AND SADJIARTO, R.
Het "wipen" van alang-alang in rubbertuinen. (**"Wiping" lalang grass in rubber plantations.**) [English and Indonesian summaries 19 and 24 lines respectively.]
Bergcultures, 1957, **26**: 187-93, illus.

A hand method of lalang control is described in which the shoots are wiped with an oily rag by grasping the plant at about soil level and drawing the rag upward. In practice the method has proved economic and effective in treating sporadic lalang infestations or for eliminating lalang thinned by chemical or mechanical treatment. The effectiveness of the oil used (solar oil or diesel fuel) was improved by adding 10% Shell Weedkiller T or Sovacide PY. Three or four treatments at 2, 3 and then 4 week intervals have generally been satisfactory.

3367. LERCHE, K.
Summary of work with herbicides in sisal.
Paper read at E. Afr. Herbicides Conf., 1957, pp. 2.

Rates of TCA which control *Digitaria scalarum* tend to be injurious to sisal. Dalapon at 15 lb./ac. gives good control without injury and is apparently independent of the wet conditions necessary for TCA to be active. Monuron, fenuron, diuron, MH and PCP appeared to have little or no effect on sisal. In one trial on 2-year-old sisal where MCPA and 2,4-D (amine and butyl) were applied, 2,4-D (amine) caused pitting of the leaves and lesions 3–4 in. long. In another trial on 1-year-old sisal 2,4-D had no effect.—*Weed Abstr.*, **6**, No. 823.

3368. LOCK, G. W., AND SANDFORD, H.
Herbicide and arboricide trials in sisal.
Paper read at E. Afr. Herbicides Conf., 1957, pp. 3.

Normally sisal nurseries require 8–10 hand weedings to obtain large transplants 40 cm. high. In experiments 30 lb./ac. TCA applied 2 weeks before planting + 1 handweeding has given equally good results, the plants recovering from an initial check. Weeds killed are listed. The addition of MCPA to TCA or following up with a post-emergence spray of 2,4-D was even better and controlled more weed species. Dalapon at 5 and 10 lb./ac. gave similar results to TCA at 20 and 40 lb./ac., and the initial injury was similarly outgrown. Monuron at 8 lb./ac. also appeared promising against certain weeds.—From *Weed Abstr.*, **6**, No. 824.

3369. (STAMPER, E. R.)
New herbicides used in Louisiana for fighting grass problems.
Sugar J., 1957, **20**(1): 34.

Dowpon has proved to be highly effective for control of late grasses in sugar cane fields in experiments during the last 3 years. Recommendations for weed control in sugar cane are given.

3370. ROBINSON, E. L.
Herbicide studies: I. The relation of 2,4-dichlorophenoxyacetic acid to pH and organic matter of soils. II. Alpha-alpha-dichloropropionic acid and 3-amino-1,2,4-triazole as herbicides on Johnson grass.
Diss. Abstr., 1956, **16**: 1991, being *Publ.* 18,820 of 109 pp.

I. Laboratory studies were made of factors influencing the adsorption, leaching and availability in different soil types of 2,4-D as the alkanolamine salt and as the polypropylene glycol butyl ether ester [see also *H.A.*, 27: 386]. II. Applications of amizol at 4 and 8 lb. per acre and dalapon at 5 and 10 lb. per acre followed by 3 cultivations gave very good control of Johnson grass. A combination of 2 lb. amizol and 8 lb. dalapon per acre, with ploughing, gave 87% reduction in top growth 4 months after treatment. Dalapon applied at 10 lb. per acre 3 times at weekly intervals during flowering killed top growth completely. Similar applications of amizol at 8 lb. killed 90% of the top growth.—Ohio St. Univ.

Weed control in turf.

(*See also* 3407i, k.)

3371. BLANDY, R. V.
Further developments in the control of mosses in sports turf with calomel (mercurous chloride).
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 779-85, bibl. 2.

Various trials to control mosses in turf with a lawn fertilizer containing ammonium sulphate and ferrous sulphate with or without mercurous chloride are described. A spring dressing of lawn fertilizer 2 oz./sq. yd. caused immediate scorching and withering of the mosses but did not prevent re-infestation the following autumn. The addition of 1 g./sq. yd. of calomel to this fertilizer gave practical control for two seasons. The amount of lawn fertilizer applied was not critical and control of mosses could be obtained with calomel alone. It was found that pleurocarp mosses could be controlled more readily than established acrocarp mosses.—From *Weed Abstr.*, **6**, No. 615.

3372. IOWA STATE COLLEGE.
Your experiment station reports. Try chemical control of crabgrass weed.
Ia Fm Sci., 1957, **11**(9): 26.

Crabgrass in turf has been successfully controlled at 3 periods in the growing season. Pre-emergence control was obtained with Crag Herbicide 1, ACP-L-842 or ACP-L-888. Treatment with phenyl mercury compounds (3 to 5 applications) at the 2-leaf stage satisfactorily reduced stands. At the seed-head stage 2 applications of potassium cyanate sprays gave good control.

3373. Mruk, C. K., and DeFrance, J. A.
Pre-emergence control of crabgrass in lawn turf with only one application of various chemicals.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 158-62, bibl. 5.

Eight herbicides applied pre-emergence in late May provided from 53 to 93% control of *Digitaria ischaemum* and *D. sanguinalis* up to July 30. By October, however, only 4 of the herbicides, i.e. Neburon 4 lb./ac., NPA, PMA 7 pints/ac. and chlordane 86 and 182 lb./ac., gave over 50% control. The most likely time when a second application may be necessary is between the end of July and beginning of September.—From *Weed Abstr.*, **6**, No. 1029.

3374. Wisniewski, A. J., and DeFrance, J. A.
Post-emergence control of crabgrass in lawn turf with chemicals.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 151-7, bibl. 5.

Several herbicides at various rates were applied as spray or dust 1, 2 or 3 times to 4-year-old turf infested with *Digitaria ischaemum* and *D. sanguinalis*. One application of any of the chemicals was not effective for control. The most promising results were obtained with 2 or 3 applications of Crab-E-Rad (12·6% disodium methyl arsonate) and PMA.—From *Weed Abstr.*, **6**, No. 1028.

3375. Matthews, L. J.
Elimination of clover from fine turf in summer-sports areas.
N.Z. J. Agric., 1957, **94**: 260, illus.

White, suckling and subterranean clover can be controlled in New Zealand sports grounds by spraying 3–4 weeks before the playing season with oil-soluble, low-volatile 2,4,5-T esters at 1–3 lb. per acre. Rosette weeds and clovers are controlled by a mixture of 0·5 lb. of 2,4-D and 2·5 lb. of 2,4,5-T per acre.

Weed control in vegetables, herbs and other crops.

(*See also* 3407d, 3495.)

3376. Linden, G.
CMU zur Unkrautbekämpfung in Spargelkulturen. **(CMU for weed control in asparagus crops.)**
Mitt. biol. Bundesanst. Berlin-Dahlem **87**, 1957, pp. 110-14, bibl. 24.

In yielding asparagus beds 2–4 kg./ha. of CMU applied before cutting started kept the beds weed-free during the cutting period. In young beds applications should not exceed 2 kg./ha. Pre-emergence spraying of seedbeds at 1·5 kg./ha. controlled weeds for 4 to 6 weeks.

3377. Ellison, J. H., and others.
Further results with monuron (Karmex-W) and its effect on flavor of processed asparagus.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 83-7, bibl. 1.

Monuron at 1, 2, 4 and 8 lb./ac. applied pre-emergence to asparagus did not affect flavour compared to untreated controls. Samples were taken at 6 different harvest dates and were either canned or frozen.—*Weed Abstr.*, **6**, No. 972.

3378. Amann, F.
Zur Bekämpfung des Franzosenkrautes in Hackfrüchten (*Galinsoga parviflora* Cavanilles.) **(The control of *Galinsoga parviflora* in row crops.)**
Mitt. biol. Bundesanst. Berlin-Dahlem **87**, 1957, pp. 62-6.

Calcium cyanamide has controlled *Galinsoga parviflora* in onions and asparagus. For onions 200–250 kg./ha. should be applied after seedling emergence, or 3 weeks after planting onion sets. In asparagus 200–300 kg./ha. should be applied at the end of May or the beginning of June, during cutting of the asparagus. Further applications may be given 8–12 days after cutting is finished and a fortnight later, in mid-July.

3379. Minshall, W. W.
Effect of 3-(4-chlorophenyl)-1,1-dimethylurea [Monuron] on dry matter production and transpiration.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): vii.

In excised bean leaves internal concentrations of 15–20 micrograms of Monuron per gram of fresh weight resulted in a 90% inhibition of dry matter production and reduced the rate of transpiration by 30–40%.—Canada Dep. Agric., London, Ontario.

3380. Detroux, L., de Faestraets, L., and Lavalleye, M.
Essai de désherbage chimique des cultures de haricots. **(Chemical weed control in bean crops.)**
Parasitica, 1957, **13**: 64-71.

Herbicidal effects were more satisfactory following post-emergence than pre-emergence applications to beans. DNBP gave the best results with both types of application.

3381. Noll, C. J.
Progress report on chemical weeding of beets and lima beans.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 38-41.

Lima beans (Fordhook 242) were treated 2 days after planting with Premerge [dinoseb] 4 and 6 lb./ac., 3Y9 [tris-(2,4-dichlorophenoxyethyl) phosphite] 1 and 2 gal./ac., neburon 4 and 6 lb./ac., butyl-N-(3-chlorophenyl) carbamate, 1-(chloropropyl-2)-N-(3-chlorophenyl carbamate), 2,4-DB (amine) 2 lb./ac., MCPB (amine) 2 lb./ac. Stand was significantly reduced by 3Y9, but yields were higher than controls for all treatments. A pre-emergence experiment in beets showed that the best treatments were TCA 10 lb. + endothal 6 oz. 12 lb./ac., CDAA 6 and 9 lb./ac., monuron 0·5 lb./ac. and diuron 0·5 lb./ac. Monuron and diuron at 1 lb./ac. reduced the stand and yield as compared to the superior treatments.—*Weed Abstr.*, **6**, No. 976.

3382. van Staalduine, D.
Bestrijding van onkruid in witlof voor de opkomst van het gewas. **(Pre-emergence weed control in chicory.)** [English summary 6 lines.]
Meded. Dir. Tuinb., 1957, **20**: 375-7.

Pre-emergence applications of PCP to chicory induced a marked reduction in plant stand. The effects of a light mineral oil or dilute sulphuric acid were much less phytotoxic and these are recommended for practical weed control.

3383. Noll, C. J.
Chemical herbicides as they effect stand and yield of beets, onions and carrots.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 307-9.

Beets were treated with TCA 10 lb. + endothal 12 or 16 lb./ac. 3 days after planting and with sodium chloride 4,000 lb./ac. a month later when the beets had 4–5 true leaves. No treatment had any effect on stand and all plots gave significantly higher yields of beet than the controls. Onions were sprayed with CIPC 5 and 10 lb./ac. 6 days after planting and potassium cyanate 16 lb./ac. 11 days after planting. Weight of untopped onions showed CIPC to be better at 5 lb. than at 10 lb./ac., while the 10 lb. rate was better than the cyanate. Yield of carrots from plots treated with Stoddard Solvent at 40–120 gal./ac. was significantly higher than that from untreated plots when application was made 1 month after planting.—*Weed Abstr.*, **6**, No. 975.

3384. Arndt, F.
Chemische Unkrautbekämpfung in Zwiebeln, Möhren und Zuckerrüben. **(Chemical weed control in onions, carrots and sugar beet.)**
Mitt. biol. Bundesanst. Berlin-Dahlem **87**, 1957, pp. 78-83.

Pre-emergence applications of CIPC and CMU to onions became more toxic as the humus content of the soil decreased. Carrots sown at a depth of 1·5 cm. on 3 soil types were not affected by soil type, but at 0·5 cm. depth herbicidal toxicity was reduced as humus content of the soil increased. In field trials PCP sprayed just before crop emergence was not toxic to onions. CIPC gave satisfactory results with carrots on all 3 soil types. In these tests weed control by PCP was less satisfactory than by CIPC.

3385. Orth, H.
Untersuchungen zur Verhütung von CIPC-Schäden an Zwiebeln und Möhren. **(Studies on the prevention of CIPC damage to onions and carrots.)**
Mitt. biol. Bundesanst. Berlin-Dahlem **87**, 1957, pp. 73-8, bibl. 1, illus.

Both carrots and onions growing in sandy soil were very susceptible to pre-emergence applications of CIPC at normal rates of application. The toxicity of CIPC was reduced as the proportion of compost in the soil was increased.

3386. Dallyn, S. L., Sawyer, R. L., and Robinson, R. W.
Progress report on weed control in onions, crucifers, and sweet corn.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 24-9.

A comparison of CIPC 4 lb./ac., monuron and diuron 0·5 lb./ac. applied to onions (Sweet Spanish) at various times after transplanting and repeated at varying later dates showed that CIPC was best for weed control. Treatment at 3-week intervals through the growing season until layby reduced the amount of hand weeding to approximately 10% of that required by the controls, without harming the onions. In 3 experiments in cabbages CIPC 1 and 2 lb./ac., CDEC 1 and 2 lb./ac., Vapam and Crag 974 were considered promising.—From *Weed Abstr.*, **6**, No. 978.

3387. Roberts, H. A.
The response of vegetable crops to applications of some phenoxybutyric acids.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 533-8.

At Wellesbourne 1 and 4 lb./ac. MCPB, 2,4-DB, 2,4,5-TB and 4-CPB were applied low volume to a number of vegetable crops at the 1–4 leaf stage and to a second series of plots nine days later. Onions—all treatments caused deformities; lettuce—all compounds injurious, spinach—all compounds except 2,4,5-TB reduced stand and growth and even 2,4,5-TB caused some deformity; radish and red beet—all compounds caused abnormalities; broad bean—only 2,4,5-TB and low rate MCPB did not reduce yield; french bean—all compounds caused damage; peas—only 4 lb. 4-CPB and 2,4-DB reduced marketable yield; carrot and parsnip—all compounds caused deformities. Celery was sprayed with MCPB only at 4 lb./ac. and results were encouraging. The reactions of 7 weed species to 3 of the herbicides were also noted.—From *Weed Abstr.*, **6**, No. 502.

3388. Hunt, J. L.
Application of pentachlorophenol emulsions for pre-emergence weed control.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 655-61, bibl. 4.

Results are reviewed of herbicidal applications of PCP 12% miscible oil product during 1955–56 by farmers and market gardeners. No cases of injury sufficient to affect populations or yields have been reported from the use of 5 lb./ac. PCP on beans and peas. Onions, leeks, lettuce and carrots appeared to be a little more susceptible, and it is considered advisable not to apply more than 3 lb./ac. PCP less than 3 days before estimated emergence. Beetroot was damaged by PCP. Rates of 8–16 lb./ac. PCP may be used in beds of narcissus and tulips with no adverse effect on flowering or on the bulbs, and treatment in November has resulted in almost complete suppression of weeds until flowering time. The material also appeared promising for iris and anemone beds. No common annual weeds appeared to be resistant to PCP at the early seedling stage.—From *Weed Abstr.*, **6**, No. 506.

3389. Roberts, H. A.
Trials with monuron for weed control in some direct-sown vegetable crops.
J. hort. Sci., 1957, **32**: 142-8, bibl. 4.

Pre-emergence applications of monuron at ½ lb. per acre on a light soil gave satisfactory control of annual weeds. Monuron applied after sowing readily killed onions, lettuce and radish, while beetroot and peas were tolerant of higher rates. Tolerance rates varied with the season with all crops. In hand-weeded plots of red beet, peas and carrots no serious yield reduction occurred after monuron applications of ¼ lb. per acre. Under wet conditions rates of ½ lb. per acre and above were phytotoxic. In unweeded plots of red beet and peas the advantages of reduced weed competition after spraying with monuron at ¼ lb. per acre outweighed the detrimental effect of the herbicide on the crop and resulted in increased yields.—Nat. Veg. Res. Stat., Wellesbourne.

3390. Danielson, L. L.
Evaluation of pre-emergence spray and granular applications of CDEC on vegetable leaf and cole crops.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 17-22, bibl. 8.

When CDEC at 1 and 2 lb./50 gal./ac. was applied pre-emergence in autumn to turnip greens, mustard greens, hanover salad, kale, cabbage and spinach there were no visible signs of injury. Higher rates of 4 and 6 lb./ac. caused some retardation of spinach and mustard greens. However, when CDEC at 2, 4 and 6 lb./ac. was applied in the spring to these crops and to broccoli, brussel sprouts and cauliflower all the crops showed some retardation during the early stages of growth: this was outgrown by the crops receiving 4 lb./ac. but not by every crop at the 6 lb./ac. rate. Ryegrass was controlled in both experiments by 4 and 6 lb./ac. CDEC. Granular applications of CDEC in Attaclay or Vermiculite were as effective for weed control as the pre-emergence spray application, acceptable control of henbit [*Lamium amplexicaule*] and chickweed [*Stellaria* spp.] being obtainable.—*Weed Abstr.*, **6**, No. 973.

3391. Blackett, R. D.
Experiments to control wild oat using α-chloro, N,N-diallylacetamide (CDAA) and 2 chloroallyl diethyldithiocarbamate (CDEC).
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 55-64, bibl. 8.

There was no injury from presowing application (1–3 weeks) of CDAA and CDEC to several crops which included peas and carrots. Post-emergence applications to winter and tick beans were also non-injurious. Under British conditions 6–12 lb./ac. are necessary for wild oat control; however, rather erratic results were obtained and it is thought this might be due to inadequate soil moisture to bring the chemical into contact with the seed; CDEC seemed to be less affected by this factor than CDAA.—From *Weed Abstr.*, **6**, No. 570.

3392. Holmes, H. M., Gregory, P., and Proctor, J. M.
Experiments with TCA for the control of wild oats in peas (progress report 1955).
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 65-8, bibl. 3.

TCA at 5 and 7·5 lb./ac. was applied to pea seedbeds 34, 20 and 11 days before sowing. In general the later application gave better control of wild oat [*Avena* spp.] and the higher rate was slightly more effective. The lower rate had no effect on pea yields and the higher reduced yields by about 10%; it is thought, however, that the increase due to the elimination of weed competition would compensate for this. Time of application had no effect on crop yield.—*Weed Abstr.*, **6**, No. 567.

3393. Proctor, J. M., and Armsby, W. A.
Further experiments on the control of wild oats in peas: progress report 1956.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 69-78, bibl. 2.

Field trials indicate that TCA at 7·5 lb./ac. should be applied to roughly broken down ploughed land in late February or in the first 3 weeks of March. Early application is necessary, presumably in order to bring the TCA in contact with germinating wild oat [*Avena* spp.] seed. During the next 2–3 weeks the land should be thoroughly cultivated 3–4 times. Peas should then be sown in rows wide enough for tractor cultivation, as TCA destroys the bloom on pea leaves making spraying with dinoseb unsafe. 90% control can be expected in this way. Later applications and/or lack of cultivation have been less satisfactory. There were indications of differences in varietal susceptibility of peas to TCA.—*Weed Abstr.*, **6**, No. 565.

3394. Reynolds, J. D., Proctor, J. M., and Hind, R. A.
Studies with phenoxybutyric herbicides in peas, 1955-56.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 499-513, bibl. 7.

MCPA (sodium and butanol), MCPB (sodium and butoxyethanol), 2,4-DB (sodium), 2,4,5-TB (sodium) all at 0·5 and 1 lb./ac., dinoseb (triethanolamine) 1 and 2 lb./ac. and a 7 : 1 mixture of MCPB and MCPA were applied to 8 varieties of peas at the 4–6 leaf stage. The effect of the above compounds is recorded on the weeds present. As nearly all of them were more or less resistant to the growth regulators, the best weed control was obtained by dinoseb and hoeing, which also gave the highest yields. The authors classify the response of pea varieties to the phenoxyacetic and phenoxybutyric herbicides as: fairly resistant—Zelka, Servo, Charles I; susceptible—Gregory's Surprise and Thomas Laxton; intermediate—Meteor, Kelvedon Wonder and Lincoln.—*Weed Abstr.*, **6**, No. 484.

3395. Hirst, R. H., and others.
Weed control in peas with dinoseb and phenoxy butyric acid derivatives.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 523-9.

In this paper, reporting on 2 sets of experiments, the reactions of several pea varieties to dinoseb, 2,4-DB and MCPB applied at from 20 oz. to 3 lb. per acre are mainly considered. Weed control appeared to be somewhat erratic.—From *Weed Abstr.*, **6**, No. 488.

3396. Jasmin, J. J., and Lyall, L. H.
Weed control in canning peas.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 34-7, bibl. 3.

Two experiments are described in which dinoseb (pre-em. 6 lb./ac., post-em. 1·5 lb./ac.), MCPB (sodium 24 oz./ac. a.e., amine 32 oz./ac. a.e., ester 24 oz./ac. a.e. post-em.), MCPA (5 oz./ac. a.e. post-em.), 2,4-D (3 oz./ac. a.e. post-em.), 2,4-DB (amine 32 oz./ac. a.e., ester 24 oz./ac. a.e. post-em.), monuron 0·75 lb./ac. were applied to Perfection W.R. peas growing on sandy loam or marginal muck. Dinoseb was more effective on mineral than muck soil, giving better yield of shelled peas and an earlier crop. On marginal muck MCPB (sodium) appears to be a suitable herbicide for canning peas, but treatment with dinoseb, monuron and the lower rate of MCPB all gave yields which were not significantly higher than the control.—From *Weed Abstr.*, **6**, No. 982.

3397. Allen, F. C.
Chemical weed control in peas.
Proc. 9th N.Z. Weed Control Conf., 1956,
pp. 66-72.

Several experiments are described, using dinoseb (ammonium and amine) and MCPA (sodium and mixed salts) at various rates and volumes, in attempts to discover the most satisfactory method of controlling weeds in peas. Some preliminary experiments with MCPB are also described; effects were in general similar to those of MCPA, though the butyric proved only ⅓ to ¼ as toxic as the acetic to garden peas. Results are discussed and conclusions presented.—From *Weed Abstr.*, **6**, No. 775.

3398. Carpenter, K., Soundy, M., and Wilson, C.
The effect of MCPB on the yield and maturity of vining and picking peas.
Proc. 3rd Brit. Weed Control Conf., 1956,
1957, pp. 515-21, bibl. 3.

Plots were sprayed with MCPB (sodium) at 1·5–6 lb./ac. The stage of growth of the peas in the various trials varied from 2–8 leaves. Resistant varieties were Alaska, Dark Skinned Perfection, Lincoln, Onward, Perfected Freezer and Thomas Laxton. Canner's Perfection and Clipper are also probably resistant. Shasta and Meteor suffered slight non-significant yield reductions. Kelvedon Wonder and Gregory's Surprise should not be sprayed. Maturity appeared to be unaffected.—*Weed Abstr.*, **6**, No. 486.

3399. Dewey, O. R., Gregory, P., and Pfeiffer, R. K.
Factors affecting the susceptibility of peas to selective dinitroherbicides.
Proc. 3rd Brit. Weed Control Conf., 1956,
1957, pp. 313-26, bibl. 7.

Wind blown soil was found to affect the surface of pea leaves, resulting in increased retention and probably penetration of dinoseb; strong wind alone has a lesser effect, while driving rain is intermediate. The damage was especially severe in the lower part of the stem. Increasing time between blowing and spraying resulted in decreased injury. Peas decrease in resistance to wind damage with age. Foliage sprays and ground application of TCA and dalapon at rates as low as 1·5 lb./ac. increased the wettability and probably permeability of peas, owing to interference with wax formation and excretion. The reaction of some weeds to these treatments was noted. Annual nettle [*Urtica urens*] was affected far more than peas by TCA at 1 lb./ac. resulting in a highly significant increase in selectivity.—From *Weed Abstr.*, **6**, No. 489.

3400. Reynolds, J. D.
Experiments with dinitro compounds for weed control in peas, 1954-55.
Proc. 3rd Brit. Weed Control Conf., 1956,
1957, pp. 329-40, bibl. 8.

The sodium, ammonium and triethanolamine salts of dinoseb and dinitroisopropylphenol (DNIPP) were compared on Marrowfat peas and 7 species of weed. On the weeds, in general, the sodium salts were inferior to the others and DNIPP was very slightly inferior to dinoseb. On peas it is suggested that where high temperatures prevail dinoseb (triethanolamine) should replace the ammonium salt in commercial practice. DNIPP (triethanolamine) or the sodium salts of either compound would be useful substitutes for dinoseb (amine) if economic factors favoured their use. There was little difference between high (60 gal./ac.) and low (15 gal./ac.) application. In 1955 interrow cultivation gave the best yields and was the cheapest treatment.—From *Weed Abstr.*, **6**, No. 487.

3401. Lachman, W. H., and Michelson, L. F.
Weed control in butternut squash—1956.
Proc. 11th N.E. Weed Control Conf., 1957,
pp. 42-4, bibl. 2.

Commercial formulations of 7 herbicides were applied immediately after planting to butternut squash. Plants treated with Premerge [dinoseb 4·5 and 6·0 lb./ac.], monuron 0·6 and 0·8 lb./ac. and CDEC 6 lb./ac. appeared normal. Tris-(2,4-dichlorophenoxyethyl) phosphite 5 and 10 lb./ac. caused considerable epinasty and seriously reduced yields. The neburon 5 and 10 lb./ac. plots showed some reduction of growth and vigour.—*Weed Abstr.*, **6**, No. 968. [For 1955 results see *H.A.*, 26: 3675.]

3402. Menges, R. M.
Effects of 2,4,5-trichlorophenoxyethyl sulfate on tomato plants and fruit.
Diss. Abstr., 1956, **16**: 1768, being *Publ.*
18,479 of 107 pp.

The effects of the herbicide on the fruit have been described elsewhere [see *H.A.*, 26: 3678 and 27: 1409]. Natrin affected young tomato plants more rapidly than mature plants. Stem tissues were disrupted in all treated plants, especially when sub-soil applications were given. Soil surface applications of Natrin hampered the growth of young tomato plants, but only slightly affected mature plants.—Rutgers Univ.

3403. Furtick, W. R.
Weed control in peppermint.
Proc. Ore. Essential Oil Grs' League, 1955,
pp. 8-12.

The main weed problems in peppermint are described. Geese are frequently used to control weeds in peppermint, but they will not eat older weeds or certain species, e.g. groundsel and purslane. Sheep are better in this respect, but sheep and even lambs eventually begin to eat the mint so they can only be used for a limited period. The use of herbicides is discussed.—*Weed Abstr.*, **6**, No. 509.

3404. Bowers, H., and Furtick, W. R.
Weed control committee report.
Proc. Ore. Essential Oil Grs' League, 1955,
pp. 29-30.

The committee recommends geese with or without sheep as the best method of weed control in peppermint. 3 geese/ac. is suggested but, where quackgrass (*Agro-*

pyron repens) is a problem, 4–5 may be needed. Quack-grass and nightshade (*Solanum* spp.) may be completely controlled by geese in 3 or 4 years. The use of Chinese goslings is recommended.—*Weed Abstr.*, **6**, No. 507.

8405. Furtick, W. R., and Chilcote, D. O.
Chemical weed control in mint.
Circ. Ore. agric. Exp. Stat. **559**, 1957, pp. 2.

Diuron 2–3 lb./ac. is recommended for weed control in established peppermint, the lower rate on light soils and the high on heavy soils. It should be applied immediately after the last working and before mint emergence. If at least 1 in. of rain has not fallen before weeds begin to germinate, at least 1 in. of water should be applied by irrigation. Dinitros and monuron are not now recommended for general use owing to the longer residual effect of diuron; monuron, however, may be used for spot treatment. Diuron may retard new plantings of mint, and unless weeds are extremely serious they should be controlled by cultivation.—*Weed Abstr.*, **6**, No. 508.

8406. Marzocca, A., and Caso, O.
Tratamientos de presiembra con DNOSBP para combatir malezas en cultivos de kok-saghyz. **(Pre-sowing treatments with DNOSBP for weed control in kok-saghyz.)**
Idia, 1956, Nos. 106/8, pp. 15-16.

In seedbeds treated with 5 and 10 l. per ha. of DNOSBP [dinoseb] the lower rate was sufficient to control weeds almost completely. An interval of 3 weeks was sufficient between treatment and sowing, but the crop failed to germinate when this was reduced to 1 week.

Noted.

8407.

a Abel, A. L.
The substituted urea herbicides.
Chem. Ind. Lond., 1957, No. 33, pp. 1106-12, bibl. 20.
A review of their properties and action.

b Blackman, G. E.
The evaluation of 2:4-dinitro-6-isopropyl-phenol as a selective herbicide.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 303-11, bibl. 7.

c Bullock, R. M., and others.
Chemical weed control in cane and bush fruits in Western Washington.
[*Mimeo.*] *Stats Circ. Wash. agric. Exp. Stats* **298**, 1956, pp. 4.
Recommendations for use of diuron and amino triazole.

d Datta, S. C., and Dunn, S.
The action of 2,4-D on mustard as modified by six different light qualities.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 275-82, bibl. 4.
See *Weed Abstr.*, 6, No. 1103.

e Ellenwood, C. W.
Controlling poison ivy in Ohio apple orchards.
Down to Earth, 1957, **13**(1): 12-13, illus.
Mainly with 1–2 pt. of Esteron 245 [2,4,5-T] in 50 gal. during second half of July.

f Elliott, J. G.
The susceptibility of rush species to the growth regulator herbicides 2,4-D and MCPA.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 293-302, bibl. 2.
Juncus effusus, *J. inflexus* and *J. squarrosus*. See *Weed Abstr.*, 6, No. 612.

g Fryer, J. D., and Evans, S. A.
The place of MCPB and 2,4-DB in British agriculture.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 553-68, bibl. 1.
A review. A table gives the susceptibility of 43 weeds to MCPA, MCPB and 2,4-DB at 2 stages of growth.
—*Weed Abstr.*, 6, No. 590.

h Fryer, J. D.
A small-scale logarithmic sprayer.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 585-90, bibl. 1.
For research purposes. See *Weed Abstr.*, 6, No. 683.

i Greenfield, I.
Turf weed control.
Gdnrs' Chron., 1957, **141**: 606-7, illus.
Including use of, and common weed responses to, MCPA, 2,4-D and 2,4,5-T.

j Hartley, G. S., Pfeiffer, R. K., and Brunskill, R. T.
The Chesterford Logarithmic sprayer.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 571-84.
Designed for mounting on a Land Rover.—From *Weed Abstr.*, 6, No. 682.

k Holly, K.
The effects of some newer herbicides on annual grass weeds.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 235-45, bibl. 5.
Results of pre- and post-emergence applications of 33 compounds.—From *Weed Abstr.*, 6, No. 575.

l Jasmin, J. J.
Herbicides et horticulture. **(Herbicides and horticulture.)**
Agriculture, Que., 1957, **14**: 45-50, bibl. 15, illus.
A review.

m Koopman, H., and Uhlenbroek, J. H.
New *s*-triazine herbicides.
Nature, 1957, **180**: 147-8, bibl. 3.
Promising for pre-emergence use.

n LEEFE, J. S.
Chemical weed control in orchards.
A.R. N. Scotia Fruit Grs' Ass. 1955, pp. 125-6.
Dalapon at 10 lb./ac. safe for grass control under apples [see also *H.A.*, 27: 349].

o LUSH, G. B.
A new development in selective weed control. Part 1: Introduction and weed control data.
Proc. 3rd Brit. Weed Control Conf., 1956, 1957, pp. 625-32.
Effects of MCPP and α-(2,4-dichloro-3-methyl phenoxy) propionic acid on *Galium aparine* and some other weeds.—From *Weed Abstr.*, 6, No. 591.

p MUZIK, T. J., CRUZADO, H. J., AND MORRIS, M. P.
A note on the translocation and metabolism of monuron in velvetbeans.
Weeds, N. York, 1957, **5**: 133-4, bibl. 3.
See *Weed Abstr.*, 6, No. 1096.

q OTTEN, R. J., DAWSON, J. E., AND SCHREIBER, M. M.
Persistence and leaching of CDEC and CDAA in soil.
Proc. 11th N.E. Weed Control Conf., 1957, pp. 111-19, bibl. 2.
Weed Abstr., 6, No. 1129.

r SKVORCOVA, L. A.
The effect of 2,4-D on the colloidal-chemical properties of vegetable cells. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1957, **114**: 203-5, bibl. 1.
Of resistant and susceptible plants.

s WOODFORD, E. K.
The toxic action of herbicides.
Outlook on Agric., 1957, **1**: 145-54, bibl. 32, illus.
A review.

VEGETABLES, TEMPERATE, TROPICAL AND GLASSHOUSE.

General.

(*See also* 3032, 3082, 3084, 3086-3088, 3089f, x, 3257, 3376-3402, 3604a, b, d, i, s, x, 3605a, f, i, k, 3996 l, 3999, 4004, 4007, 4014, 4019, 4020, 4025.)

3408. MOORE, J. F., AND DARROCH, J. G.
Field plot technique with Blue Lake pole beans, bush beans, carrots, sweet corn, spring and fall cauliflower.
Tech. Bull. Wash. agric. Exp. Stats **21**, 1956, pp. 30, bibl. 11.

A sandy loam soil was used for uniformity trials with pole and bush beans, sweet corn, carrots and cauliflower. Plot precision as measured by coefficients of variation appeared to be high, and varied for the different crops. Based on lineal feet of row the greatest efficiency was obtained with bush beans, then with pole beans; carrots showed the least precision. Treatment number, and block and plot shape affected the degree of plot precision.

3409. ALKMAAR.
2e Jaarverslag 1956, Proefstation voor de Groenteteelt in de Volle Grond in Nederland. (**Second Annual Report of the Experiment Station for Vegetable Growing in the Open, Alkmaar**), 1957, pp. 59, illus.

Soils and manures: the effect of levels, dates and types of chemical and organic manures and composts on various crops. *Breeding and variety trials* with vegetables including beans, peas, tomatoes, endive, gherkins, celeriac, cauliflowers and strawberries. *Cultural measures:* warm storage of shallots; shelter crops for beans. *Pests and diseases:* white cabbage banding; *Colletotrichum* on *Digitalis;* endive fire and peppermint rust; virus diseases of seed carrots, rhubarb and lettuce; control of cabbage root fly, onion fly and carrot fly. *Weed control:* in strawberries, leeks, spinach, onions, chicory and carrots.

3410. COMMITTEE ON VEGETABLE BREEDING.
New vegetable varieties List IV.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 574-87.

This includes vegetables introduced into the U.S.A. since 1936 by North American federal and state institutions, trade organizations and private individuals. Thirty sorts of vegetable are concerned, with one or generally more than one introduction in each case. For previous lists see *Ibidem*, *Vols* 63, 65 and 67.

3411. SMIRNOVA, A. N.
Biochemical characteristics of some vegetables cultivated in Turkmenia. [Russian.]
Izv. AN Turkm. SSR, 1956, No. 2, pp. 68-73, from abstr. in *Ref. Ž.* (*Biol.*), 1957, No. 6, abstr. 22722.

The composition of some tomato, eggplant, cucumber, cabbage and carrot varieties grown in the Ašhabad region is given. Compared with similar vegetables in the central belt of the U.S.S.R. they contained approximately 1½ times as much sugar, a little more protein and less acid. Earlier work has shown that Ašhabad vegetables are high in vitamins A and C.

3412. HAMILTON, L.
Indigenous versus introduced vegetables in the village dietary.
Papua New Guinea agric. J., 1955, **10**: 54-7.

This discussion of the nutritional value of vegetables and fruits eaten by the natives of Papua and New Guinea includes a table showing the calorific value and contents of protein, Ca, Fe, vitamin A, thiamin and ascorbic acid of 10 indigenous and 10 introduced vegetables.

3413. MINISTRY OF AGRICULTURE, LONDON.
Seed testing for farmers.
Adv. Leafl. Minist. Agric. Lond. **247**, 1957, pp. 5.

An account of the service offered by the Official Seed

Testing Station at Cambridge and how it can be utilized. Cereal, root and common vegetable seeds are covered.

3414. WALLEN, V. R., AND OTHERS.
Treatment of vegetable seed for improved emergence—1956.
Plant Dis. Reptr, 1957, **41**: 468-73, bibl. 1.

The results are summarized of trials involving treatments with 9 fungicides and insecticides, applied alone or in combination, to seeds of 13 vegetables (6 cucurbits, 4 legumes, beet, corn and swedes). All the types of seed, except swedes, responded to most fungicide treatments by increased field emergence. The insecticide aldrin used alone did not, in general, improve emergence, but it controlled seed corn maggot. Its use in combination with a fungicide is therefore recommended for bush and lima beans, peas, corn and cucurbits.—Sci. Serv., Canada Dep. Agric., Ottawa.

3415. KOOMEN, J. P.
Ervaringen met windschermen bij de teelt van enkele groentegewassen. **(Experience with windbreaks in vegetable growing.)** [English summary 1 p.]
Meded. Proefst. Groent. Volle Grond, Alkmaar **6**, 1957, pp. 43, bibl. 10, illus.

In 3 seasons' trials with French beans, shelter was provided by oats, wheat, maize and broad beans. Yield and quality of the beans were markedly improved by shelter. Oats formed the best screen, provided that it was topped as the ears appeared; stiff-strawed varieties are recommended. In one season's trial Koga II wheat showed promise. Broad beans and maize were not satisfactory. The shelter rows should be sown at the end of March in a north–south direction, spaced at 5–6 m. Oats also gave satisfactory results in protecting gherkin crops.

3416. IIJIMA, T.
On the physiology and utilization of vitamin B$_1$ in garden crops. VIII. The effects of foliar sprays of vitamin B$_1$ on the photosynthesis of some horticultural plants. [Japanese, with English summary 6 lines.]
J. hort. Ass. Japan, 1957, **25**: 247-50, bibl. 23, illus.

Photosynthesis was increased in kidney beans and cabbages by spraying the leaves with vitamin B$_1$. [See *H.A.*, 23:3074; 26: 3260 and 27: 1479 for earlier parts.]

3417. ROMNEY, E. M., AND OTHERS.
Plant uptake of Sr^{90}, Y^{91}, Ru^{106}, Cs^{137} and Ce^{144} from soils.
Soil Sci., 1957, **83**: 369-76, bibl. 9.

Soil pot experiments were conducted in 1952 and 1953 to evaluate the capacity of barley, bean, carrot, lettuce and radish plants to take up radioactive fission products from several different soils under greenhouse conditions. Results of these experiments show that virtually no Y^{91}, Ru^{106}, Cs^{137} or Ce^{144} was taken up by these crop plants. Sr^{90} was readily taken up and was concentrated in greatest amounts in leaf tissue. Radish tops generally accumulate the greatest amounts of Sr^{90} per unit weight, followed by foliage of beans, carrots, lettuce and barley, in decreasing order. The highest Sr^{90} levels were found in plants grown on acidic soils low in calcium, and the lowest levels on the alkaline-calcareous soils. The highest percentages of these fission products removed by crops from the soils studied were: Sr^{90}, 8·68%; Y^{91}, 0·03%; Ru^{106}, 0·13%; Cs^{137}, 0·48%; and Ce^{144}, 0·02%. It is concluded that the ability of crop plants to take up relatively large amounts of Sr^{90} might produce serious problems on soils that are excessively contaminated with products of nuclear fission. Intensive cropping is apparently not effective for the removal of fission products from soils within a single cropping period; repeated cropping, however, might be fairly effective for decontaminating soils over a long period of time and more effective for acidic soils than for alkaline-calcareous soils. [From authors' summary and conclusions.]—Univ. Calif.

3418. BETTER CROPS WITH PLANT FOOD.
[Placement of fertilizer.]
Bett. Crops, 1957, **41**(6): 47, illus.

This number is devoted to the value of proper placement of fertilizer and how it can be achieved. Reference is made to the good effects of fertilizer placement on tobacco, beans, tomatoes, onions and spinach, and the doubtful effect on carrots, but chiefly in these articles the farm crops are considered.

3419. JOHNSON, C. M., AND OTHERS.
Comparative chlorine requirements of different plant species.
Plant and Soil, 1957, **8**: 337-53, bibl. 6, illus.

Plants in which acute Cl deficiencies or decreased dry weight yields were induced in low-Cl culture solutions included lettuce, tomato, cabbage, carrot and bean. Under identical conditions squash plants were apparently unaffected, except for transient chlorosis of the younger leaves. All the plants acquired some Cl from an unknown (possibly atmospheric) source, those most active in this respect being least sensitive to lack of Cl in the solutions.—Univ. Calif., Berkeley.

3420. HOWLES, R.
Attempts at the chemotherapy of virus-infected glasshouse plants.
Plant Path., 1957, **6**: 46-8, bibl. 5.

The multiplication of aucuba mosaic virus or potato virus X was retarded in tomatoes by post-inoculation treatment with malachite green. Pre-inoculation treatment with malachite green or ½ saturated 2-chlorophenoxyacetic acid also delayed the appearance of virus symptoms. Sulphanilamide plus glucose applied to the roots and foliage of chrysanthemum cuttings infected with tomato aspermy virus had some therapeutic effect. In a series of tests with various chlorophenoxyacetic acids, both 3-chlorophenoxyacetic acid and 2,4-D freed some chrysanthemum plants from tomato aspermy virus. Treating tomato seed, infected with tobacco mosaic virus, with 2-chlorophenoxyacetic acid inactivated the virus at germination, but other factors may also have played a part. With infected lettuce seed the acid had no effect.—Glasshouse Crops Res. Inst., Littlehampton.

3421. TAMAYO, B. P., AND ORILLO, F. T.
Seed treatment of vegetables for control of damping-off.
Philipp. Agric., 1957, **40**: 519-24, bibl. 4.

In a test of 5 fungicides for control of pre-emergence damping-off significant differences between treated and control plots were obtained in 3 of the 6 vegetables tested. At dosages of 0·5% by weight of the seeds, Granosan and Semesan (mercury compounds) significantly increased emergence of Chinese cabbage seedlings. Spergon significantly increased emergence of cabbage seedlings, and resulted in the best emergence of eggplant. Lettuce seeds were injured by Granosan, Semesan and Arasan SF-X. Crag 5400 and Granosan proved to be high in protective value especially for cucumber seedlings. The fungicides did not give satisfactory protection against post-emergence damping-off.

3422. David, W. A. L., and Aldridge, W. N.
The insecticidal material in leaves of plants growing in soil treated with parathion.
Ann. appl. Biol., 1957, **45**: 332-46, bibl. 24.

After parathion solutions had been watered on to soil around the roots of cabbage plants with leaves infested with *Brevicoryne brassicae*, *Myzus persicae* or *Pieris brassicae* larvae, these leaves showed a toxic effect on the feeding insects. In comparable experiments *Aphis fabae* on leaves of broad bean was not affected at dosages that damaged the plants. The effect on the cabbage plants was observed when the parathion was of the highest degree of purity, although it was greater with commercial grade material. It occurred when all possibility of a fumigant action was excluded. In plants treated with pure parathion the translocation of the paraoxon formed under the influence of the roots was sufficient to account for the toxic effects produced. With commercial parathion, analogues or isomers present as impurities may also be translocated. Both these sources of systemic poisons should be borne in mind when considering parathion treatment of green-soil in which food crops are to be grown. [From authors' abstract.]—Agric. Res. Coun., Cambridge, and Med. Res. Coun., Carshalton.

3423. Birdsall, J. J.
The effects of chlorinated hydrocarbon insecticides on the flavor of vegetables.
Diss. Abstr., 1956, **16**: 1985-6, being *Publ.* 17,300 of 132 pp.
Birdsall, J. J., Weckel, K. G., and Chapman, R. K.
Effects of chlorinated hydrocarbon insecticides on flavors of vegetables.
J. agric. Food Chem., 1957, **5**: 523-6, bibl. 17.

Seven chlorinated hydrocarbon insecticides were each applied at 2 rates to 11 vegetables in both foliar and soil treatments. All the applications were found to affect the flavour of one or more of the crops, the effect being more apparent in canned than in cooked or raw forms. Certain vegetables (snap bean, tomato, carrot, cucumber) seemed to be resistant to flavour changes due to insecticidal treatments, while others (squash, pumpkin, beet, swede) were susceptible. Generally, soil treatments had a more pronounced effect on flavour than had foliage treatments. Some changes in the flavour of the treated vegetables occurred during storage, especially when canned. Changes in flavour due to insecticide treatments were not always undesirable. Colour variations occurred in yellow vegetables as well as in beets. Alterations of flavour and colour could not be definitely associated with chemical residues.—Univ. Wis.

3424. Tave, J.
La lutte contre les vers gris dans les cultures maraîchères. **(Control of cutworms in market garden crops.)**
Terre maroc., 1957, **31**: 151-2.

Poisoned baits containing BHC or sodium fluosilicate, or soil treatment with BHC or dieldrin, are advised against the soil-inhabiting types of cutworm. Spraying or dusting with BHC (Lindane) or parathion are advised against types living above ground.

3425. Borg, Å.
Massförekomst av tusenfotingar i växthus. **(Mass occurrence of millipedes in greenhouses.)**
Växtskyddsnotiser, 1956, No. 4, pp. 60-3, bibl. in text, illus.

A series of experiments was carried out using insecticidal solutions or poison baits for millipede control. Of the insecticidal solutions watered on soil plots in cucumber houses aldrin was the most effective and gave 70–90% mortality. In pot studies lindane powder (1%) plus aldrin (20%) applied at 10 g./sq. m. gave good control. Poison baits consisting of 10 parts wheat bran with 2 parts 3% aldrin or 1 part 20% aldrin gave some control. Poison baits containing aldrin became effective after about 4 days. In further experiments Paris green in bran at 1 : 20 gave 100% mortality after 1 day, and a thiophosphate bait gave 100% mortality after 3 days.

3426. Hartman, J. D., and Isenberg, F. M.
Waxing vegetables.
Cornell Ext. Bull. **965**, 1957[?], pp. 14, illus.

The following types of waxing are described: (1) Dipping in ordinary wax emulsions=water waxing; (2) foam waxing; (3) spray waxing with emulsions; (4) spray waxing with hydrocarbon waxes; (5) drip of melted wax or wax and non-volatile mineral-oil mixtures; (6) application of solid cake wax; (7) dipping in melted paraffin; and (8) waxing stem scars of tomatoes. Vegetables commonly treated with wax include peppers and tomatoes, cucumbers, canteloupes and less frequently carrots, parsnips, eggplants or small summer squashes. A list is given of 11 firms in the U.S.A. from which waxes or waxing plant can be obtained.

3427. Åvall, H.
Konsumtionsförpackning av köksväxter. **(Prepackaging vegetables.)** [English and Esperanto summaries ½ p. each.]
Medd. Trädgårdförs. Alnarp **102**, 1957, pp. 46, bibl. 14.

Transofilm sealed by heating and perforated by 2 holes 6 mm. wide per ½ kg. bag has proved a suitable packing material for small quantities. For weights of between 1½ to 4½ kg. polythene is preferable. Polythene does not show the products quite so attractively, but being permeable to oxygen and CO_2 it does not generally need perforating. A chart is given showing from Swedish or, in some cases, foreign experience the method of preparation, sort of pack, type of film, temperature desirable, relative humidity and approximate length of storage period without deterioration for asparagus, green and wax beans, broccoli, brussels sprouts, cabbage, carrots, cauliflower, sweet corn, lettuce, mushrooms, spinach and tomatoes.

Artichokes.

(*See also* 3604f.)

3428. Parsons, P. S., and Sciaroni, R. H.
Artichoke production.
Calif. Agric., 1957, **11**(7): 9.

Itemized costs are presented for the production of globe artichokes in the Half Moon Bay area of California in 1956–57. The average total cost, excluding management, was $513.36 per acre or $2.20 per 22 lb. box. A yield of 225 boxes is considered good.—Univ. Calif., Davis.

3429. Lange, W. H., and others.
Artichoke plume moth control.
Calif. Agric., 1957, **11**(7): 8-10, illus.

The moth *Platyptilia carduidactyla* is the main limiting factor to the production of globe artichokes in California. Experiments and commercial practice have demonstrated the value of properly-timed parathion dust and spray applications for control. In general, 3 applications, 15 to 20 days apart, are needed, and these should be applied in the months immediately preceding peak production periods. Other insecticides giving good results in trials in 1956 included guthion, chlorthion, phosdrin and dylox. Control should be supplemented by proper disposal of tops and other sanitation measures.—Univ. Calif., Davis, etc.

3430. Bártfay, J.
A csicsóka tárolásáról. **(On the storage of Jerusalem artichoke.)**
Szeszipar, 1956, No. 7, pp. 226-8, from abstr. in *Hung. agric. Rev.*, 1957, **6**(2): 4-5.

Of 4 methods of keeping Jerusalem artichokes the most satisfactory, as judged by alcohol yield on distillation, was leaving the tubers in the ground. Second was stratification in sand, third bulk storage in sheds with no insulation, and the lowest yield was given by those treated with a sprouting inhibitor containing 2% α-NAA.

Asparagus.

3431. Nijveldt, W. C.
Levenswijze en bestrijding van de aspergevlieg (*Platyparea poeciloptera* Schrank) in Nederland. **(Biology and control of asparagus fly in the Netherlands.)** [English summary 1¼ pp.]
Versl. Landbouwk. Onderz. **63.4**, 1957, pp. 40, bibl. 38, illus.

DDT 5% dust did not prevent oviposition, and better results were obtained by DDT mist sprays. Soil treatment with aldrin or dieldrin dusts was not satisfactory. Larvae in the stems were not killed by systemic insecticides. Cultural control has been most effective, viz. cutting off infested stems as low as possible.

Brassicas.

(*See also* 3063, 3064, 3070, 3604e, p, v, w, 3605d, j.)

3432. Čereeva, S. N., and Gončarik, M. N.
New forms in cabbage. [Russian.]
Agrobiologija, 1957, No. 1, pp. 78-83, bibl. 7, illus.

Observations in 1951–1952 and experiments in 1953–1954 showed that the variability of the cabbage variety Nomer Pervyj in the Far North [see *H.A.*, 25: 3923] is caused by the vernalizing action of low spring temperatures. This leads to mutation and to the appearance of various forms atypical of the variety. To prevent this, the variety should be sown at the end of April.

3433. North, C.
Studies in morphogenesis of *Brassica oleracea* L. 1. Growth and development of cabbage during the vegetative phase.
J. exp. Bot., 1957, **8**: 304-12, bibl. 3.

Cabbages may take 60 days to reach the grand period of growth during the summer, yet under similar conditions an early variety can grow to maximal weight in a further 50 days. The cabbage head differs from the well-defined storage organs of the turnip and carrot; the leaf portion, from which the head is comprised, does not grow at a much greater rate than that of the other primary parts of the plant as does the root portion of turnip and carrot. Nevertheless, the head contains reserve sugars and therefore presumably functions as a storage organ. Five varieties differed in rate of leaf initiation, growth in length of stem and time of flower initiation, but none of the differences was correlated with sequence of maturation. The head is the aggregate of folded leaves and increases in proportion to the rest of the plant mainly because leaves are initiated and continue to grow in size after leaf unfolding has slowed down or ceased. The time of retardation of leaf unfolding is a varietal characteristic which largely determines the time of maturation. One possible explanation of the phenomenon of cessation of leaf unfolding, based on the configuration of young leaves around the stem apex, is discussed. [From author's summary.]—Scot. hort. Res. Inst., Mylnefield, Invergowrie.

3434. Schuphan, W., and Weinmann, I.
Chemisch-physikalische Untersuchungen zur Samendiagnostik von Brassicaarten und -sorten. **(Chemico-physical studies on the seeds of *Brassica* species and varieties.)**
Naturwissenschaften, 1956, **43**: 452-3, bibl. 11.

A clear differentiation was found possible between the seeds of *Brassica* species by paper chromatographic methods applied to the vacuum concentrated methanol extracts of the different seeds.

3435. Nakagawa, H., and Henmi, S.
Effect of low temperature treatment on autumn seed production of Chinese cabbage. [Japanese, with English summary 20 lines.]
Misc. Publ. hort. Dir. nat. Tohoku agric. Exp. Stat. **8**, 1954, pp. 4.

Chinese cabbage plants exposed to −2 to −1° C. for 32 days immediately after germination flowered early in autumn and produced ripe seed of high (81%) germination percentage. The possibility of thus getting two generations in one year should be useful to breeders.

3436. Jensma, J. R.
Teelt en veredeling van bloemkool. **(Growing and breeding cauliflower.)** [English summary 2½ pp.]
Meded. Inst. Vered. Tuinbouwgew. **96**, 1957, pp. 61, bibl. 34, illus.

A series of trials on growing and breeding cauliflowers have been carried out in the Netherlands. Frost damage to glasshouse crops may be avoided by planting in March instead of December without delaying maturity by more than 2 days. There was a strong correlation between earliness and leaf number in early crops grown in the open. Age of transplant was one of the main factors affecting the occurrence of buttoning, and varietal effect was also important. Potted plants were more inclined to button than plants pricked out. Molybdenum treatment at transplanting resulted in decreased buttoning. In a summer crop plants which had been crowded in the seedbed gave the lowest percentage of buttoning. Earliness was hardly affected by sowing date. By growing plants on a dry seedbed of poor soil under crowded conditions, the plants remained vegetative and could be transplanted satisfactorily under unfavourable conditions. A method of seed growing is described in which old transplants are used, thus inducing buttoning and early flowering. Self-pollination is the dominant method of pollination Unripe seed will germinate normally if it is sown soon after harvesting. In breeding studies no harmful effects have been observed after 4 generations of inbreeding; male sterility occurred at a rate of 0·05%. Cuttings for vegetative propagation may be obtained from plants maturing in August by removing the curd, after which shoots develop on the roots and stem base within 2–3 weeks; plants maturing in November and December should be dug up and kept frost-free during the winter and will produce shoots in the spring. Breeding with a view to the use of special cultural methods is also discussed.

3437. Massey, P. H., Jr., Eheart, J. F., and Young, R. W.
Variety, year, and pruning effects on the dry matter, vitamin content, and yield of broccoli.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 377-85, bibl. 19.

A 3-year study conducted in Virginia on the green sprouting broccoli varieties DeCicco and Early Green Sprouting gave the following results: *Variety:* The central and lateral inflorescences of DeCicco were considerably higher in carotene and somewhat higher in ascorbic acid content than those of Early Green Sprouting. The central inflorescences of Early Green Sprouting gave higher yields, and the laterals and leaves lower yields, than those of DeCicco. The vitamin and dry matter contents of the leaves were similar in both varieties. *Year* was found to exert a considerable influence on all factors studied. *Pruning* the newly initiated central inflorescence increased the yield of the laterals but resulted in a lower total yield of inflorescence. The removal of 5 and 10 leaves per plant increased the total yield of edible material by 37 and 71% respectively over the yield of unpruned plants. The carotene content of the leaves was about four times higher than that of the inflorescence and their use as a food is strongly recommended.

3438. Vimba, B., and Indriksons, Ė.
Fertilizing with sapropel. [Russian.]
Sad i Ogorod, 1957, No. 5, p. 32.

In Latvia in 1954 sapropel, an organic sediment [see abstr. 3070], applied at 40 tons per ha. resulted in higher cabbage but lower carrot yields than the same amount of FYM. Cabbage seedlings grew better in pots made from a mixture of peat and sapropel than in pots made from peat and compost.

3439. Popov, V. I.
Varietal resistance of cabbage to black rot. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk, 1957, **22**(5): 26-9, bibl. 5, illus.

In the Voronež region, under conditions of natural and artificial infection with *Xanthomonas campestris*, certain varieties of cabbage showed high resistance to black rot. It was found that while both resistant and susceptible varieties became infected when inoculated, the resistant varieties did not evince symptoms of the disease at all or only at a very late stage. Examination showed that in resistant varieties infection was confined to the xylem elements of the stem and roots, and in these varieties the ratio between the mechanical and parenchymal tissues was much greater than in the susceptible varieties. Although this characteristic is hereditary it is influenced by nutrition and water supply, lack of N and excess of K increasing resistance and *vice-versa*.

3440. Macfarlane, I. (and Last, F. T.).
Club-root of cruciferous plants.
A.R. Rothamsted exp. Stat., 1956, 1957, pp. 117-19.

In previous work it appeared that griseofulvin sprayed on plants growing in infected soil decreased club-root almost as much as when added to the soil, but further experiments showed that it was not absorbed by the leaves and must have reached the soil before acting. In infected cabbage plants the dry-weight ratio of roots to tops steadily increased as soon as root symptoms were visible and the disease reduced the number, area, thickness and growth rate of leaves. The larger the plant at inoculation, the larger was the club that developed.

3441. Rosser, W. R.
Control of club root of brassicae.
Plant Path., 1957, **6**: 42-4, bibl. 9.

Four fungicidal treatments were applied to cabbage seedlings for control of club root (*Plasmodiophora brassicae*). Griseofulvin was applied twice to the seedbed and also at transplanting. Cadmium chloride, mercuric chloride and pentachloronitrobenzene (PNCB) were applied at transplanting, and all 3 materials induced a temporary check in growth. Despite unfavourable weather conditions good control was obtained with PNCB and mercuric chloride. With the mercuric chloride treatment significant increases in yield were also obtained. There was some indication of phytotoxicity with PNCB. Griseofulvin and cadmium chloride both gave poor control of the disease, and both compounds reduced the weight of green matter in comparison with the mercuric chloride treatment.—N.A.A.S., Wolverhampton.

3442. Šederov, S. G.
Local (hole) application of lime for cabbage. [Russian.]
Tr. Vses. n.-i. in-ta udobr., agrotehn. i agropočvoved. 1955, No. 31, pp. 191-201, from abstr. in *Ref. Ž.* (*Biol.*), 1957, No. 6, abstr. 22500.

Field trials in 1945–1949 in the Moscow region showed that local application (in the planting hole) of lime at 0·5–1 t./ha. increased yields as effectively as a broadcast application of 5 t./ha. ploughed in. Where club root was a problem, liming reduced its incidence and increased yields, a local application of 1·5 t./ha. being more effective during the first years than 10 t./ha. broadcast and ploughed in.

3443. Natti, J. J.
Control of downy mildew of broccoli with antibiotics.
From abstr. in *Phytopathology*, 1957, **47**: 245-6.

Streptomycin was the most effective of the numerous antibiotics tested for protecting broccoli foliage from infection by *Peronospora parasitica*. Its effectiveness was enhanced by glycerol or by exposing the sprayed plants to constant misting. It served as a surface and as an absorbed protectant.

3444. Quak, F.
Bladvlekkenziekte bij spruitkool veroorzaakt door *Mycosphaerella brassicicola* (Fr.) Lindau. **(Ringspot disease of brussels sprouts caused by *Mycosphaerella brassicicola*.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1957, **20**: 317-20, bibl. 1.

In spore germination tests zineb and captan were highly fungicidal to ascospores of *Mycosphaerella brassicicola*, but in field experiments the sprays did not reduce infection of sprouts. In 40 varieties no resistance to *Mycosphaerella* was found.—Inst. PlZiekt. Onderz., Wageningen.

3445. Isaac, I.
***Verticillium* wilt of brussels sprout.**
Ann. appl. Biol., 1957, **45**: 276-83, bibl. 3, illus.

A wilt disease of brussels-sprout plants caused by *Verticillium dahliae* Kleb. is described. Field observations indicate that the disease is more severe in a wet than in a dry season, the various stages of the pathological symptoms appearing earlier and developing more rapidly. This was corroborated by experiment. Since 9 different strains and/or species of *Verticillium* wound-inoculated into brussels sprouts failed to induce wilt, and since the isolation from this host proved to be non-pathogenic to a wide range of plants usually susceptible to attack by *Verticillium* spp., it is suggested that the *V. dahliae* from brussels sprouts is a distinct physiological strain. Variations in the amounts of the different chemical constituents of the soil (Ca, N from two different sources, P and K) have no apparent effect upon the incidence of disease. The pathogen is not seed-borne but it may be spread by the dissemination of infected plant tissues. Some control measures are suggested, and farmers are advised to grow in the infected soil runner beans, cauliflower and broccoli which are resistant to attack by this fungus. [From author's abstract.]—Univ. Coll., Swansea.

3446. Fox, C. J. S.
Experiments on control of the cabbage maggot at Kentville, N.S., 1952-1953.
A.R. N. Scotia Fruit Grs' Ass. 1955, pp. 149, 151-2.

In clubroot (*Plasmodiophora brassicae*) infected soil 2 drenches of corrosive sublimate gave poor control of root fly (*Hylemyia brassicae*) on early cabbage, but high yields were obtained owing to partial control of clubroot. Good control of root fly but lower yields were obtained with a single drench of chlordane, aldrin or dieldrin.

3447. (Wiggell, D.)
Calomel with aldrin solves two problems.
Grower, 1957, **48**: 239, illus.
Combined treatment for cabbage root fly and club root.
Comm. Gr, 1957, No. 3212, p. 190.

Treatment of cauliflower with a pure calomel-aldrin dip has given good results in control experiments for cabbage root fly and club root.—N.A.A.S., Lancs.

3448. Drijfhout, E.
De dompelmethode ter bestrijding van de koolvlieg. **(The dip method for control of cabbage root fly.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1957, **20**: 303-9, bibl. 3, illus.

Root-dipping summer cauliflower in aldrin, chlordane or heptachlor solutions gave control of cabbage root fly equal to that obtained by other methods of insecticidal application. Growth was slightly inhibited just after treatment so that harvesting was delayed by 2–4 days. In comparison with the dusting method, root-dipping saved 90% of the cost of chemicals and labour.—Rijkstuinbouwconsulentschap, Leeuwarden.

3449. Krieg, A.
Über die Möglichkeit einer Bekämpfung des Kohlweisslings (*Pieris brassicae*) durch künstliche Verbreitung einer Bakteriose. **(The possible control of cabbage white butterfly by artificial application of bacteria.)** [English summary 8 lines.]
Z. PflKrankh., 1957, **64**: 321-7, bibl. 22, illus.

Spore suspensions of *Bacillus thuringiensis* were applied to cabbage leaves in laboratory and field trials. Complete kill of 3rd and 4th instar *Pieris brassicae* larvae feeding on treated leaves occurred after 5 days in laboratory trials, and after 6 days in field trials.—Inst. biol. Schädlingsbekämpf., Darmstadt.

3450. Wene, G. P.
Cabbage looper control.
J. econ. Ent., 1957, **50**: 39-41, bibl. 2.

Good control of cabbage looper, *Trichoplusia ni*, was obtained with the following insecticidal dusts: 1·5% endrin; 20% toxaphene; 5% DDT with 2% parathion or 3% malathion; 0·9% piperonyl butoxide with 0·06% pyrethrins; 0·1% pyrethrins with 0·1% of the activator, N-octyl bicycloheptene dicarboximide; 5 and 7·5% malathion; 0·75% rotenone with 2% malathion; and Shell OS 2046. The data indicate that the cabbage looper control programme should start when the larvae are small. [From author's summary.]—Tex. agric. Exp. Stat., Weslaco.

3451. Wright, D. W., and Buxton, J. S.
The control of the cabbage stem weevil in brassica seed-beds.
A.R. nat. Veg. Res. Stat., Wellesbourne, for 1956, 1957, pp. 57-9, bibl. 2.

Both the application of lindane suspension (0·02%) in a band along the rows when the seedlings were in the second to third true leaf stage and seed treatment with lindane (75%; 1 oz. per 1 lb. seed) gave practically complete control of the cabbage stem weevil (*Ceuthorhynchus quadridens*) on cabbage. The authors prefer the seed dressing because of the greater ease of application. Other insecticides tested proved less effective than lindane, which also afforded substantial protection against cabbage root fly and flea beetle (*Phyllotreta* sp.). The triple purpose seed treatment with lindane is recommended for use on brassica crops generally, with the exception of radishes and of turnips grown for human consumption.

Celery.

(*See also* 3564.)

3452. Lingle, J. C., and Carolus, R. L.
Mineral nutrition of celery varieties with special reference to sodium and boron.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 309-17, bibl. 14.

The celery varieties Utah 10B and Summer Pascal were grown in greenhouse sand and soil cultures, and Cornell 19, Emerson Pascal, Summer Pascal and Utah 10B in the field, at varying levels of B, Na, K and Ca. Applications of B significantly increased yields in both types of greenhouse culture. Utah 10B developed cracked stem in the soil culture, while Summer Pascal in the same pots did not. Utah 10B contained higher Na and K but lower B and Ca concentrations than Summer Pascal. In the field B failed to influence yields in a soil amply supplied with B, but Na increased them in a soil containing ample K. Cornell 19 responded to Na at low pH, while the other varieties did so only at high pH. B treatments were detrimental without Na, but increased yields in Cornell 19 and Emerson Pascal when sodium salts were applied. Applications of all 4 elements increased their respective concentrations in the plants. Consistent varietal differences were shown in the B concentration of the plants. Na concentration was significantly higher in Cornell 19 and Ca in Emerson Pascal than in the other varieties, but no varietal differences were found for K concentration. Na significantly reduced B concentration in all varieties, suggesting a Na : B relationship.—Mich. St. Univ., E. Lansing.

3453. Spurr, A. R.
Boron in morphogenesis of plant cell walls.
Science, 1957, **126**: 78-80, bibl. 13, illus.

Cell wall formation in 3 celery varieties was studied under varying levels of B nutrition. Under B deficiency conditions the walls of most collenchyma cells were much thinner, and the walls of phloem parenchyma and ground parenchyma cells were much thicker, than at normal B levels. It is considered that under B-deficient conditions carbohydrates from the phloem are condensed in the parenchyma tissue before they reach the more peripheral collenchyma, an interpretation which is in line with the hypothesis that B facilitates the translocation of carbohydrates in the plant.—Univ. Calif., Davis.

3454. Yamaguchi, M., and Minges, P. A.
Brown checking of celery, a symptom of boron deficiency. I. Field observations, variety susceptibility, and chemical analyses.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 318-28, bibl. 14, illus.

Of 10 varieties initially observed Summer Pascal and Utah 52-70 were most resistant to brown checking and the cracked stem associated with it, and Utah 10-B was the most susceptible. These 3 varieties, together with Utah 16 which has shown some tolerance, were used in further studies. Chemical analysis showed that Summer Pascal absorbs more B than does Utah 10-B, while Utah 52-70 and Utah 16 were intermediate in B content. The K : B ratio indicated that, along with low B, high K content may be a factor in causing brown checking. The use of resistant varieties, reduced K applications, and B foliage sprays have been successful in preventing this disorder in the field.—Univ. Calif., Davis.

3455. Yamaguchi, M., Minges, P. A., and Knott, J. E.
Brown checking of celery, a symptom of boron deficiency. II. The effect of high nitrogen and high potassium fertilization.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 448-54, bibl. 7.

Utah 10-B celery is highly susceptible to boron-deficiency induced brown checking. In these trials no brown checking was found in this variety or 2 others grown in soil with a high B content. At a second place brown checking was shown in plots fertilized with N or N+K in the varieties Utah 10-B and Utah 16 but not in 2 others. At a third place, where only Utah 10-B was planted, all treatments including controls showed brown checking, but the N and N+K treated plants showed the most. The addition of gypsum or gypsum +high rates of K did not increase the incidence of brown checking.—Univ. Calif., Davis.

3456. Crane, R. I.
Comparative costs of five methods of handling celery.
Veg. Crops Ser., Univ. Calif. Davis **86**, 1956, pp. 5, bibl. 1.

Conveyor loading into baskets on a trailer was the most economical method, but caused most damage to the petioles. Packing into field crates was the most expensive method used. Comparative labour requirements and costs of the 5 handling methods are tabulated.

3457. Berg, W.
Möhrenfliegenbefall an Sellerie. **(Celeriac attacked by carrot fly.)**
Reprinted from *Rhein. Mschr. Obstb.*, 1957, No. 5, 1 p., illus.

In recent years the carrot fly (*Psila rosae*) has attacked celeriac crops in the Rhineland and caused serious losses in some varieties. The biology of the pest was found to be the same as it is on carrot. Dipping the seedlings before transplanting in a slurry of soil and 0·1% aldrin emulsion is recommended for control.

Cucurbits.

(*See also* 3049, 3064, 3072, 3090e, 3604h.)

3458. WILSON, J. D., JOHN, C. A., AND WOHLER, H. W.
Ohio MR-200—a mosaic-tolerant slicer-type cucumber.
Res. Circ. Ohio agric. Exp. Stat. **41**, 1957, pp. 11, bibl. 4, illus.

A comparison of this large type cucumber with Marketer and Burpee Hybrid indicates the suitability of Ohio MR-200 for growing in Ohio where losses from Cucumber Mosaic No. 1 are prevalent.

3459. BELIK, V. F., AND PODMOGAEVA, M. I.
Interspecific hybridization of *Cucurbita*. [Russian.]
Agrobiologija, 1957, No. 1, pp. 128-32, bibl. 4, illus.

In experiments at Novočerkassk it was found that, while it was not possible to cross-pollinate varieties of *Cucurbita maxima*, *C. pepo* and *C. moschata* in any single combination, it was possible to obtain fruit from one species by cross-pollinating with mixed pollen of the other two. The most promising results were produced by *C. maxima* var. Belaja Medovaja 611 × *C. pepo* var. Kustovaja 39 + *C. moschata* var. Birjučekutskaja 644. This hybrid 136 is drought resistant and prolific with large, good quality fruits.

3460. BOHN, G. W., AND DAVIS, G. N.
Earliness in F_1 hybrid muskmelons and their parent varieties.
Hilgardia, 1957, **26**: 453-71, bibl. 19.

Date of planting was the most important factor affecting rate of development in muskmelon varieties and hybrids. Varieties exhibited marked differences in rate of development. It is thought likely that it will be possible to produce from some crosses true-breeding lines of muskmelons that mature earlier than either parent.

3461. ITO, H., AND SAITO, T.
Factors responsible for the sex expression of Japanese cucumber. V. Causal interpretation of the effects of pinching and growth substances on the transformation of the primordia of the staminate flower nodes. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **25**: 213-20, bibl. 14.

Pinched stem tips of cucumber were treated with lanolin containing either NAA or TIBA (2,3,5-triiodobenzoic acid). The staminate nodes were unchanged in NAA-treated plants, but TIBA allowed sex reversal in the lower staminate nodes while preventing it in the upper ones. It is concluded that sex expression in cucumber depends on the auxin relationship of the nodes concerned. [For previous parts see *H.A.*, 24: 2667; 25:1680; 27: 440 and 1462.]

3462. ŠMERDA, V., AND TICHÝ, S.
Vliv prohřívání a stáří semene na výnos plodů okurek. (**The effect of heat treatment and age of seed on cucumber yields.**) [Russian, English and German summaries ½ p. each.]
Sborn. čsl. Akad. zeměd. Věd, Rostl. Výroba, 1957, **30**: 223-30, bibl. 5.

In experiments extending over 3 years cucumber plants from 1-year-old seed, heated for periods varying from 15 to 60 min. at temperatures ranging from 40° to 80° C., were compared with plants raised from 1-, 2- and 3-year-old unheated seed. The best treatment, 30 min. at 60° C., improved female flower production and increased yields by 30% compared with 2-year-old untreated seed and by 20% compared with 3-year-old untreated seed.

3463. ŠTAMBERA, J.
Možnosti zvětšení a posílení kořenového systému rychlených okurek hříženim postrannich os. (**The possibilities of enlarging and strengthening the root system of greenhouse cucumbers by layering the laterals.**) [Russian and English summaries ¼ p. each.]
Acta Univ. Agric. Silvic., Brno, Ser. A, 1956, No. 4, pp. 273-7, bibl. 4, illus.

By layering the 2 lowest lateral shoots of cucumber plants when 40–50 cm. long and, after roots had developed, removing their apices and any secondary laterals, a 20% yield increase was obtained. The method is being introduced into commercial practice.

3464. DASKALOFF, C., AND POPOWA, D.
Anwendung der Pfropfmethode bei der Gewächshauskultur der Zuckermelone (*Cucumis melo* L.). (**The use of grafting in growing glasshouse melons.**)
Dtsch. Gartenb., 1957, **4**: 151-4, bibl. 7, illus.

By grafting melons on *Cucurbita* species yields were increased up to 95%, and harvesting started 3 or 4 days earlier than with the controls. Fruit composition and flavour were not affected by grafting. The best results were obtained when the hybrid Persijki No. 5 × Plowdiwski banani was grafted on *Cucurbita maxima*.—Inst. Pflanzenb., Sofia.

3465. CLARKSON, V. A., AND FRAZIER, W. A.
Effect of paper and polyethylene mulches and plastic caps on cantaloupe yields and earliness.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 400-404, bibl. 7.

Yields of melons from black and grey paper and polythene mulch plots were 2 to 3 times greater than from untreated plots. Growth in general was greater, vine growth being unusually heavy on the polythene plots. Plastic (polystyrene) caps promoted early germination and plant growth but were less effective than paper mulch as regards yield and to avoid damage they had to be removed in hot weather. Black polythene, tested one year, proved resistant to wear, retained its black colour and was an excellent mulch. Summer temperatures in Western Oregon are generally cool.—Corvallis, Ore.

3466. KON'KOVA, E. A., ANISIMOV, A. A., AND KORCHAGINA, L. E.
Intensity of photosynthesis when potassium bicarbonate is applied to soil as a supplementary source of soil carbon dioxide. [Russian, with English summary.]
Fiziol. Rast., 1956, **3**: 534-8, from abstr. in *Soils and Ferts*, 1957, **20**, abstr. 1385.

$KHCO_3$ was applied at rates of 80–120 kg./ha. K_2O to potatoes and cucumbers in field experiments and at

100 mg. K_2O/100 g. of soil to beans in pot experiments. Equivalent amounts of K_2SO_4 were applied to the controls. $KHCO_3$ increased assimilation of atmospheric CO_2 by the leaves, the chlorophyll content of the leaves, respiration, and amino acid synthesis by the roots.

3467. Kendrick, J. B., Jr., and others.
Cantaloupe crown blight study.
Wedding, R. T., and others.
Crown blight of cantaloupe.
Calif. Agric., 1957, **11**(5): 5-6, illus., and **11**(6): 5-7, illus.

Crown blight is the name applied to a premature breakdown and death of the crown leaves, which has seriously affected all commercial cantaloupe varieties planted in the winter and harvested in the spring in the desert regions of California and Arizona. These two articles give a summarized progress report on a series of investigations designed to discover the factor or factors responsible. The studies have covered varieties, seasonal variations, soils and rotations, nutrients, soil moisture and temperature, light intensity, and pathogenic fungi. The results suggest that the leaf symptoms are caused by an inadequate root : shoot ratio combined with unfavourable weather conditions at a time when vegetative and fruit growth is rapid. Root growth has been correlated with the temperature at 6 in. below the soil surface when this is expressed as degree-days (heat units) above 60° F. The inadequate root systems associated with crown blight may be due to relatively cool, moist conditions early in the season, accentuated by a root pruning effect of one or more soil fungi. Further investigations are in progress.—Univ. Calif., Riverside, and U.S.D.A., La Jolla.

3468. Conroy, R. J.
Fusarium wilt of rockmelon (*Cucumis melo* L.) in New South Wales.
J. Aust. Inst. agric. Sci., 1957, **23**: 152-4, bibl. 7.

Fusarium wilt (*Fusarium oxysporum* f. *melonis*) of rockmelon was first recorded in N.S.W. in 1955. In a field trial carried out in the infested area it was found that 82% of the plants of Delicious 51 remained healthy compared with only 4 to 17% of the plants of 3 other varieties.—Dep. Agric., N.S.W. J.R.L.

3469. Ark, P. A., and Thompson, J. B.
Control of downy mildew of cucumber with antibiotics.
Plant Dis. Reptr, 1957, **41**: 452-4, bibl. 4.

Among antibiotics sprayed onto cucumbers shortly before, or shortly after, inoculation with *Pseudoperonospora cubensis* the following gave satisfactory control: amphomycin, mycostatin and terramycin each at 500 p.p.m., patulin and polymixin each at 100 p.p.m., streptomycin at 1,000 p.p.m. in Nuclay dust, and tyrothricin at 100, 300 and 500 p.p.m.—Univ. Calif., Berkeley.

3470. Gellatley, J. G., and Mosse-Robinson, I.
Spraying and dusting cucurbits for pest control.
Agric. Gaz. N.S.W., 1957, **68**: 144-50, illus.

Pest control and phytotoxic effects on squash and cucumber plants were determined for 18 spray or dust combinations. There was no build-up of red spider on squash plants, but powdery mildew was not controlled unless S was included in the insecticidal treatments. Spray applications did not adversely affect squash growth, but dusts of BHC+S and parathion+S caused leaf scorch and yield reductions. On cucumber plants leaf yellowing in characteristic patterns was induced by DDT or BHC emulsions and bordeaux sprays. Combination dusts of 1% BHC+50% S, or 1·5% parathion+50% S resulted in more leaf burn than either of their components alone. Red spider infestation was best controlled by parathion (0·01%)+dispersible S spray, parathion (1·5%) dust and parathion+S dust. Red spider infestation was stimulated by DDT (0·01%) and bordeaux sprays, and by DDT or BHC+bordeaux combinations.

3471. University of California.
Melon clinic.
Reprinted from *Proc. Conf. Transportation of Perishables*, California, 1956, pp. 14, bibls.

The subjects discussed in this series of articles are the effect of loading method on successful melon transport, breeding for good carrying and eating qualities, using ethylene to ripen honeydew melons, shipping in fibreboard containers, market diseases and modified refrigeration.

3472. Eaks, I. L., and Morris, L. L.
Deterioration of cucumbers at chilling and non-chilling temperatures.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 388-99 bibl. 27.

Observations on behaviour of cucumbers held at different temperatures of from 0 to 30° C. lead to the conclusion that they should preferably be kept slightly above 10° C. during handling, transit and storage.—Univ. Calif., Davis.

Legumes.

(*See also* 3034-3036, 3038, 3041, 3044, 3045, 3048, 3052, 3053, 3056-3059, 3064, 3065, 3067, 3069, 3072, 3076, 3090d, e, h, p, 3212, 3336, 3604g, k, q, z, 3605b, g, m, p, 3997a, 3999.)

3473. Ministry of Agriculture, London.
Peas.
Bull. Minist. Agric. Lond., **81**, 4th edition, 1956, pp. 26, illus., 3s.

In this new edition of the Ministry's bulletin on pea growing, last published in 1949 [see *H.A.*, 20: 858], the sections on green peas for market and for processing have been largely rewritten and a new section has been incorporated on chemical weed control. Lists of varieties have been revised and modern developments with regard to manuring, harvesting and threshing are discussed.

3474. Buishand, T., and others.
Rond de teelt van snijbonen in de volle grond. (**Growing French beans in the open.**) [English summary 1 p.]
Meded. Proefst. Groent. Volle Grond, Alkmaar **7**, 1957, pp. 44, illus.

Results from experimental plots throughout the Netherlands are summarized in this report on French bean cultivation. Dwarf varieties are grown exclusively for early harvest. Climbing varieties are often interplanted with other crops. Manurial practices are described. Choice of variety varies according to the district in which the beans are grown.

3475. Inoue, Y., and Suzuki, Y.
Studies on the flower bud differentiation, flowering and fruiting of peas, *Pisum sativum* L. IV. On the flowering and fruiting. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **25**: 221-6, bibl. 6.

Seeds of 11 varieties were sown in November and March. Percentage fruit set was very low in the latter part of the flowering season in November-sown plants. Varietal differences in number of flowers per plant depended mainly on plant height, number of two-flowered inflorescences and branching habit. Numbers of pods per plant also showed varietal differences. Some parthenocarpic pods developed from late flowers. The order of flowering at the nodes was the same as that of flower-bud initiation. Pod distribution was densest at the lower nodes of the main stem and vigorous branches. In two-flowered inflorescences the distal flowers usually opened the day after anthesis of the proximal ones, and after fruiting the proximal pods were longer and contained more seeds than the distal, although both originally contained the same number of ovules. [For parts I–III see *H.A.*, 25: 2868, 3949.]

3476. Paton, D. M.
Thermoperiodic and photoperiodic control of flower initiation in a late pea variety.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): ix-x.

Factors affecting time of initiation and node position of the first flower of the variety Greenfeast were studied in controlled environment chambers. The rate of node formation was affected by growing temperature but only slightly by photoperiod. Temperature changes during vegetative growth modified the photoperiodic response. Variation of temperature during dark periods was the main factor causing acceleration of flowering in plants grown in an 8-hour day between 7° C. and 26° C.—Calif. Inst. Tech., Pasadena.

3477. Moškov, B. S.
The effect of photoperiodic conditions on the daily rhythm of bean leaf movement. [Russian.]
Biofizika, 1956, **1**(4): 334-40, from abstr. in *Ref. Ž.* (*Biol.*), 1957, No. 6, abstr. 22407.

Plants of the bean variety Robjust ulučšennaja were grown under artificial light (incandescent and luminescent) at a light intensity ~200 watt/sq. m. with from 3 to 24 hour day-lengths. Sixteen treatments of 4–6 plants each were used. The different light sources gave similar results. A clear relationship was displayed between nyctinastic movements and length of illumination periods. During a 24 hr. day no movement occurred. The length of time during which leaves rose or sank in different photoperiods, the time in days it took the plants to adapt themselves to different treatments and the movement of leaves in advance of change from light to darkness and *vice-versa* are discussed. Flowering of plants in 8 hr. and longer photoperiods occurred at about the same time. At the shortest photoperiod, 3–4 hrs, flowering was delayed by 12–14 days. The author suggests a relationship between nyctinastic movements and diurnal metabolic rhythm, and that a study of this relationship in legumes could help to determine the optimum photoperiodic conditions and thereby increase yields. For beans the optimum is considered to be a 13–18 hr. day.

3478. Hodgson, G. L., and Blackman, G. E.
An analysis of the influence of plant density on the growth of *Vicia faba*. II. The significance of competition for light in relation to plant development at different densities.
J. exp. Bot., 1957, **8**: 195-219, bibl. 13.

Reduction from high to low plant density before flowering had little influence on growth. During early stages of ripening, the greater the plant density, the steeper was the light gradient between the apex and base of each plant. In pot experiments with screens the compensation point was about 0·1 daylight. With a density of 11–12 plants per sq. m. over 97% of each shoot received intensities higher than this, but with 55–65 plants per sq. m. up to 38% of the plant received lower intensities. Removing upper leaves or shading the apex increased pod abscission. Removal of some of the inflorescences, especially from lower nodes, had the reverse effect. Decapitation increased the proportion of immature to mature pods. Shading lower nodes reduced the number of pods maturing in these positions but increased the number maturing higher up the plant.—Dep. Agric., Univ. Oxford. [For part I see *H.A.*, 26: 3756.]

3479. Pecket, R. C.
The initiation and development of lateral meristems in the pea root. I. The effect of young and of mature tissue. II. The effect of indole-3-acetic acid.
J. exp. Bot., 1957, **8**: 172-80, bibl. 6, and 181-94, bibl. 8.

I. The effect of distinct regions of the root on the initiation of lateral root primordia and the emergence of lateral roots has been studied, using segments of roots from sterile 2-day germinated pea seedlings. It is shown that the removal of the basal region causes a decrease in the number of primordia formed in the remainder of the root. On the other hand, the removal of the apical region causes a larger number of primordia to be formed in the remaining tissue than in the corresponding tissue of roots where the apical region is retained. It is suggested that a factor or a complex of factors involved in primordium initiation is translocated from the older tissue towards the potential site of primordium initiation in the young tissue which has just completed extension growth. The removal of the apical region of the root is also shown to stimulate lateral root emergence. It is suggested that a factor or complex of factors involved in the development of the primordia subsequent to initiation moves within the root in a similar manner to the factor or factors involved in initiation. II. Observations made on roots in which three regions have been distinguished show that increasing IAA concentration does not cause similar changes in all parts of the root, nor does it cause identical effects or primordium initiation and on the subsequent emergence of the initials as lateral roots.

The latter fact explains why the emphasis in the present work has been laid on initiation rather than on emergence. The results of experiments are reported in which two variables are involved, IAA concentration and the presence or absence of the two terminal regions of the root. These results are considered to support the conclusions of the earlier paper. It is suggested that the stimulant moving from mature tissue is not IAA itself, but that the production of the stimulant may be increased when IAA is supplied. A gradient of reaction to the stimulant appears to exist in the root, reaction being maximal in the mature tissue. [From author's summaries.]—Bot. Dep., Univ. Leeds.

3480. Sprent, J. I., and Barber, H. N.
Leaching of a flower inhibitor from late varieties of peas.
Nature, 1957, **180**: 200-1, bibl. 2.

It was found that the flower-delaying substance produced by late varieties of pea [see *H.A.*, 22: 2588 and 26: 607] could be leached from cuttings soaked before planting. The leaching effect was greatest in cuttings taken 6–11 days after germination when the flower-inhibitor was still in a labile phase. After 15–20 days from germination the inhibitor became incorporated in the cytoplasm and could no longer be removed.—Univ. Tasmania, Hobart.

3481. Darbre, A., and Norris, F. W.
Determination of free and combined inositol in the ungerminated bean seed and the young plant.
Biochem. J., 1957, **66**: 404-7, bibl. 18.

In the ungerminated bean seed only 5·2% of the total inositol was found to be in the free state but up to 74% in the young plant. A concentration gradient of inositol down the plant is shown to exist from the shoot apex to the roots. The concentration in the leaves increases with progressive stages of growth. [From authors' summary.]

3482. Fowler, H. D.
The changes in orthophosphate in relation to phytin formation in maturing peas.
J. Sci. Food Agric., 1957, **8**: 333-41, bibl. 34.

Studies of the developing seeds of two pea varieties showed that the orthophosphate and phytin contents were negatively correlated. Changes in these contents followed a similar pattern in both varieties. Between the 17th and 30th days after blossoming the orthophosphate content, initially high, fell rapidly and the phytin content rose. For a short period after this the trend was reversed, but then continued, though more slowly, as the peas matured. The bearing of these transformations on the texture of peas is discussed. For canning purposes the best texture coincided with the first phase when orthophosphate was falling and phytin rising.—Fruit Veg. Canning quick Freez. Res. Ass., Chipping Campden.

3483. Murphy, H. J.
Growth regulators help snap bean production.
Me Fm Res., 1957, **5**(1): 17-18.

Applications of Duraset 20-ω (N-meta tolyl phthalamic acid) at ½ lb. p.a. or 100 p.p.m. of 2,4,5-T to snap beans increased pod set and also improved the percentage of desirable size beans for preserving.

3484. Raggio, M., and Raggio, N.
Relación entre cotiledones y nodulación y factores que la afectan. (**The relationship between cotyledons and nodulation, and factors affecting it.**) [English abstract ½ p.]
Phyton, 1956, **7**: 103-19, bibl. 30, illus.

When soya beans and black wax beans were grown in aseptic, nitrate-free liquid medium, subsequently inoculated with *Rhizobium*, nodulation occurred in both light-grown and etiolated whole plants and in plants bearing only cotyledons. With the *Rhizobium* strains used, nodulation occurred on main and lateral roots in soya bean, but almost entirely on lateral roots in wax bean. The presence of nitrate in the medium greatly depressed nodulation of etiolated seedlings in both species. With light-grown soya beans nitrate did not significantly reduce the number of nodulated plants but did reduce the number of nodules per plant. Nodulation of light-grown wax beans was inhibited in the same way as that of etiolated seedlings. With light-grown plants bearing only cotyledons, the response to nitrate varied with the species of bean, the differences being related to the difference in the permanence of the cotyledons. Addition of 2% sucrose to either nitrate-free or nitrate-containing media caused intense inhibition of nodulation under all conditions tested. Great variation in the rate and amount of nodulation was encountered in both species.—Univ. Calif., Berkeley.

3485. von Hausen, S. S., and van Gylswyk, N. O.
The survival of *Rhizobium* bacteria in soil.
S. Afr. J. Sci., 1957, **53**: 233-5, bibl. 10.

A local strain of *Rhizobium leguminosarum* showed better survival under various conditions in South Africa than did 3 introduced strains, as measured by the number of nodules subsequently produced by Greenfeast pea plants. The superior survival of a local strain of *R. trifolii* was also established in seed inoculation tests on *Trifolium pratense*.—Plant physiol. Res. Inst., Univ. Pretoria.

3486. Terzaroli, A. L.
Il trattamento microbico della semente di leguminose. (**Bacterial inoculation of leguminous seeds.**)
Ital. agric., 1957, **94**: 447-56, bibl. 30, illus.

A Swedish bacterial preparation called Nitragin was compared with an Italian culture of *Bacillus radicicola* [*Rhizobium*]. For beans and lupins both gave equally good results in nodulation.

3487. Pérez-Escolar, R., and Lugo-López, M. A.
The effect of synthetic soil conditioners on soil-aggregate stability and the production of potatoes and stringless beans. [Spanish summary ⅓ p.]
J. Agric. Univ. P.R., 1957, **41**: 127-33, bibl. 6.

Applications of 2 formulations of Krilium and one of Aerotil at various concentrations increased the stability of the soil aggregates, but stringless beans grown on these soils gave similar crops to those grown on untreated plots. J.R.L.

3488. MURPHY, H. J.
Anhydrous ammonia shows up well on processing crops.
Me Fm Res., 1957, **5**(1): 31-2.

In trials with processing beans over a wide range of soil conditions anhydrous ammonia gave higher yields and longer pods than nitrate of ammonia, both being applied as side-dressings.

3489. WITTWER, S. H., TEUBNER, F. G., AND McCALL, W. W.
Comparative absorption and utilization by beans and tomatoes of phosphorus applied to the soil and foliage.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 302-8, bibl. 7.

In these glasshouse pot trials about 10 times as much P^{32} was applied to the soil as adhered to the foliage. The amount of applied phosphate in the developing bean and tomato fruits was determined. Mean values for micrograms of P and percentage of total P in the fruits derived from foliar treatments were more than double those from soil applications and the efficiency of utilization as so determined was approximately 20 times greater. This was particularly noticeable on sandy soil.—Mich. St. Univ., E. Lansing.

3490. WARINGTON, K.
Chelated iron complexes as sources of iron in solution culture.
A.R. Rothamsted exp. Stat., 1956, 1957, p. 77.

Chlorosis in peas was prevented, without toxicity symptoms, more effectively by EDTA (Na) than by ferric citrate in solutions of pH 5·5 containing 0·1 p.p.m. of Fe. Leaf scorch followed the antichlorotic action of 0·5 p.p.m. EDTA (Na_2), DTPA (diethylene triamine penta-acetic acid) or nitrilo acetic acid. In further tests involving both acid and alkaline solutions with Fe at 0·5 and 2 p.p.m., EDTA (Na) was effective at either pH and was generally superior to *cyclo*-hexylenediamine tetra-acetic acid (which surpassed ferric citrate only in alkaline solution), gluconic acid, saccharic acid, *bis*-hydroxyethyl glycine, EDTA (Na_2) and nitrilo acetic acid (which was effective only in acid solution).

3491. KATTAN, A. A., AND FLEMING, J. W.
Effect of irrigation at specific stages of development on yield, quality, growth and composition of snap beans.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 329-42, bibl. 15, illus.

One season's work in Arkansas with the snap bean variety Wade showed that drought injury and water consumption increased with the age of the plants. Irrigation from sowing to flowering was of no value provided soil moisture was adequate throughout the rest of the growing season and the seed was sown in moist soil. The NPK content of the leaves decreased with age, the decrease being greatest for N. It is concluded that for maximum yield and quality it is essential to maintain available soil moisture during flowering and pod development above 50%.

3492. GRAY, R. A.
Combating plant virus diseases with a new antiviral agent, Cytovirin.
Plant Dis. Reptr, 1957, **41**: 576-8, bibl. 5.

Local lesion formation by southern bean mosaic virus and tobacco mosaic virus was completely prevented by spray levels of 0·5 to 1 p.p.m. of crystalline Cytovirin [an antibiotic isolated from *Streptomyces* sp.]. Remarkable protection from systemic infections caused by tomato spotted wilt virus and tobacco mosaic virus resulted when tomato and tobacco plants were sprayed twice with a solution containing 100 p.p.m. of the crude antiviral agent. [Author's summary.]—Merck Sharp and Dohme Res. Lab., Rahway, N.J.

3493. WILTSHIRE, G. H.
The susceptibility of French beans to infection with tobacco necrosis virus.
A.R. Rothamsted exp. Stat., 1956, 1957, p. 95.

Susceptibility generally varied inversely with carbohydrate content, but when abnormal conditions occurred for short periods susceptibility often varied in the same direction as carbohydrate content, or was unrelated to it. Infiltration of sucrose+potassium phosphate into bean leaves for 3 days preceding inoculation reduced susceptibility of darkened leaves, but not that of illuminated leaves. Sucrose alone had no effect, but glucose slightly increased susceptibility. Infiltration of 2,4-D reduced susceptibility of darkened leaves without definitely affecting their carbohydrate content. With fluctuation of greenhouse temperature between 8° and 38° C. susceptibility showed maxima at 4 a.m. and 4 p.m. daily. At constant temperatures of 24° and 30° C. the diurnal rhythm was less evident and at 36° C. susceptibility declined steadily.

3494. BURKE, D. W.
Bacterial wilt of pinto beans on soils of different types and cropping histories.
Plant Dis. Reptr, 1957, **41**: 671-3, bibl. 5.

In certain areas of the United States bacterial wilt (*Corynebacterium flaccumfaciens*) causes heavy losses of beans injured by hail. Incidence of the disease is generally lower in clay loam than in sandy loam. The author's study suggests that this difference in severity is due to the greater suppressive action of the microflora upon the pathogen in the more finely textured soil.—Irrig. Exp. Stat., Prosser, Wash.

3495. BURKE, D. W., AND SELISKAR, C. E.
Disease incidence and yields of beans in relation to cultivation injury in northeastern Colorado.
Plant Dis. Reptr, 1957, **41**: 483-7, bibl. 2, illus.

An examination of cultivator damage in 12 bean fields showed that an average of 23·5% of the plants had been injured on the lower part of the stem or root. A *Fusarium* rot of the stele was found to be closely associated with this mechanical damage. Bacterial wilt, caused by *Corynebacterium flaccumfaciens*, but not the wilt caused by *Sclerotinia sclerotiorum*, was also favoured by this damage. Non-injured plants produced a greater seed yield than injured ones in 9 out of 10 fields. Application of a herbicide, the amine salt of chlorophenoxy butyric acid, killed weeds without showing phytotoxicity to bean plants. However, there was little difference in disease incidence between plots so treated and those receiving mechanical cultivation that had caused relatively little injury. [From authors' abstract.]—Agric. Res. Serv., U.S.D.A. and Colo. A. & M. Coll., Fort Collins.

3496. Grossmann, F.
Über ein ungewöhnlich starkes Auftreten von *Ascochyta boltshauseri* Sacc. an Bohnen (*Phaseolus vulgaris*). **(An unusually severe attack of *Ascochyta boltshauseri* on beans.)**
NachrBl. dtsch. PflSchDienst., Braunschweig, 1957, **9**: 65-8, bibl. 6, illus.

Seed treatment with organic mercurials, TMTD or Cerenox did not reduce fungus attack. Captan was the most effective spray material for *Ascochyta* control. —Inst. PflPath. PflSchutz, Univ. Göttingen.

3497. Dekker, J.
Inwendige ontsmetting van door *Ascochyta pisi* aangetaste erwtezaden met de antibiotica rimocidine en pimaricine, benevens enkele aspecten van het parasitisme van deze schimmel. **(Internal disinfection of pea seed, infected by *Ascochyta pisi*, with the antibiotics rimocidin and pimaricin, together with some aspects of the parasitism of this fungus.)** [English summary 6 pp.]
Tijdschr. PlZiekt., 1957, **63**: 65-144, bibl. 83, illus.

Pea seed infected with *Ascochyta pisi* was soaked for 24 hours in a solution of 75 p.p.m. rimocidin or pimaricin. The fungus infection of plants grown from these seeds was reduced from 30–40% to 1–2%, without affecting germination. Antibiotic application as a powder or slurry was not satisfactory, probably owing to leaching in the soil. A 100% disinfection could not be obtained without inhibiting germination. Various aspects of pea infection by *Ascochyta pisi* are discussed.—Lab. Phytopath., Wageningen.

3498. Slope, D. B.
Chocolate spot of beans (*Botrytis cinerea*).
A.R. Rothamsted exp. Stat., 1956, 1957, p. 120.

Infection was heavier on winter-sown than on spring-sown broad beans. Observations made in August showed no consistent effect of either P or K fertilizers.

3499. Buxton, E. W.
Pea wilt and foot rot.
A.R. Rothamsted exp. Stat., 1956, 1957, pp. 114-15.

Of 9 English pea varieties tested only Kelvedon Triumph and Harrison's Glory were resistant to wilt (*Fusarium oxysporum*). In a pot experiment wilt was reduced by 70% by DNPB treatment of soil before planting. but similar treatment 4 days after planting was ineffective. In field experiments a pre-sowing soil drench with DNPB delayed wilt onset, but did not check subsequent severity of attack. The pea variety Onward was resistant to nearly all, and Alaska and Delwiche Commando to all strains of wilt isolated from wilt-sick soil. Foot rot (*F. solani*) spread faster than wilt and the normal rate of spread of each was reduced when both were present. Germination of wilt spores varied widely according to the chemical nature of the soil; variation in germination of *F. solani* spores was definite, but less striking. Wilt resistance appeared to depend on root excretions, but whether their action is direct or via the rhizosphere microflora has not yet been determined.

3500. Wilcox, J., and Howland, A. F.
Experiments for the control of spider mites on lima beans.
J. econ. Ent., 1957, **50**: 128-32, bibl. 2.

In tests from 1952 through 1955 against *Tetranychus telarius* on lima beans in southern California, the following materials were the most promising: demeton, Am. Cyanamide 12008 and 3911, Rohm & Haas FW-152 and FW-293, Stauffer R-1303; Hercules AC-528, Aramite and ovex. Against *T. deviatarsus* good to very good results were obtained with demeton, Holcomb 326, Rohm & Haas FW-293, Aramite and parathion. Sulphur, which was ineffective against *T. telarius*, was fairly effective against *T. deviatarsus*. Demeton, FW-293 and Aramite were the only materials effective against both species. [From authors' summary.]—Ent. Res. Br., agric. Res. Serv., U.S.D.A.

3501. Haegermark, U.
Något om bekämpningen av bönstjälkflugans larver. **(On the control of bean seed fly larvae.)**
Växtskyddsnotiser, 1956, No. 4, pp. 49-51, bibl. in text, illus.

Pre-sowing treatment of beans with lindane gave effective control of bean seed fly larvae. It is recommended that 250 g. of 20% lindane plus 200 g. of 50% thiram should be used per 100 kg. seed.

3502. Dugger, W. M., Jr., Humphreys, T. E., and Calhoun, B.
Influence of n-(trichloromethylthio)-4 cyclohexene-1,2 dicarboximide (Captan) on the metabolism of pea and corn seedlings.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): vii.

Captan treatment had little effect on the gross morphology of young pea seedlings or on respiration; the utilization of C^{14} labelled sugars and organic acids, however, was drastically altered by captan.—Fla agric. Exp. Stat., Gainesville.

3503. Tomkins, R. G.
Peas kept for 20 days in gas store.
Grower, 1957, **48**: 226-7.

In small-scale trials garden pea varieties were successfully stored at 32° F. in 5% CO_2. Under these conditions peas maintained their culinary quality better than when stored in air, and fungal pod rotting was also somewhat reduced.—D.S.I.R., Ditton Lab., Kent.

Mushrooms.

(*See also* 3604r.)

3504. Schisler, L. C.
A physiological investigation of sporophore initiation in the cultivated mushroom, *Agaricus campestris* L. ex Fr.
Diss. Abstr., 1957, **17**: 958, being *Publ.* 20,973 of 65 pp.

The possible functions of the casing layer in commercial mushroom production were investigated. Normal fruiting resulted when mycelium-impregnated compost was cased with the same, but unspawned, compost;

normal fruiting also occurred when moistened silica sand was used as casing. It was shown that a generous rate of air movement over the surface of the casing soil was important for normal initiation of sporophores. A fluctuating pattern of respiration was normal in mushroom metabolism. Respiration in cased flasks increased for a period of 6 to 13 days starting soon after casing; there was another momentary increase at the time of "clump" formation, and a third increase with the rapid growth of the pinheads. It is suggested that the mycelium produces a hormone-like substance of high molecular weight and low volatility; the casing layer inhibits the volatilization and/or diffusion of this substance, which builds up to the concentration required to stimulate fruiting of the mycelium in the compost. The same substance may also inhibit fruiting if present in too high a concentration by adversely affecting the rhizomorphs in the casing layer —Pa St. Univ. [See also *H.A.*, 23: 757 and 764].

3505. Willam, A.
Étude de l'évolution biochimique des composés phosphorés dans les composts et de la nutrition phosphorée du champignon.
(Study of the biochemical transformation of phosphorus compounds in composts and of phosphorus nutrition of mushrooms.)
Rapp. Comité Appl. Méth. isotop. Rech. agron. 1955–1956, pp. 91-101.

Oven-made compost was no more homogeneous than that made by standard methods. There was very little conversion of added mineral P into organic forms. Mushroom growth was not adversely affected by radioactivity up to 1·66 millicuries per kg. of fresh manure. The gill surfaces and outer part of the stalks were rich in P. Growth on malt agar was improved by radioactivity at initial activities of $19 \times 10^{-4} - 16{\cdot}5 \times 10^{-1}$ microcuries per g. of medium. Mycelial morphology was not affected.

3506. Heron, P. N.
Santobrite (technical sodium pentachlorophenate) for sterilization of mushroom trays.
MGA Bull., 1957, No. 89, pp. 158-63.

Laboratory and commercial tests have shown that dipping mushroom trays for 2 to 4 seconds in a 2% aqueous solution of Santobrite will effectively sterilize them. The treatment keeps the trays in a comparatively clean condition, freeing them from disease fungi and adhering mycelium, and also gives good control of cecid larvae. Yields following treatment have been raised by as much as ½ lb. per sq. ft. The repeated use of Santobrite does not result in an injurious build-up, but certain precautions should be observed in the use of treated trays.—Monsanto Chemicals Ltd.

3507. Hirst, J. M., and Stedman, O. J.
Spore trapping.
A.R. Rothamsted exp. Stat., 1956, 1957, p. 114.

Wind-tunnel studies showed that spores of the 'mat' fungus infecting mushroom compost were little disturbed from the substratum at low wind speeds, but readily dispersed at high speeds or by disturbing the dry compost. Further experiments are in progress to determine whether beds normally become infected by air-borne spores.

3508. Staniland, L. N.
The swarming of rhabditid eelworms in mushroom houses.
Plant Path., 1957, **6**: 61-2, bibl. 3, illus.

Large masses of eelworms (*Rhabditis* sp.) have been reported as infecting mushroom compost. Peak heating of the compost after it had been moved into the house consistently gave complete kill. Transmission is probably through workers picking and trimming the beds.—N.A.A.S., Bristol.

Onions and the allied crops.

(*See also* 3037, 3039, 3040, 3065, 3604c, j, 3605c, 3643.)

3509. Crnko, J., and Cavia, C. E.
Lineas mejoradas de cebolla valenciana.
(Improved strains of Valenciana onions.)
Idia, 1956, Nos. 106/8, pp. 84-6.

The 3 new strains compare very favourably with established ones in showing no premature flowering, scarcely any bull neck [?] and excellent keeping quality.

3510. Joslyn, M. A., and Peterson, R. G.
Pigment formation in *Allium cepa* tissue. I. Factors affecting red pigment formation in macerates of Southport White Globe onions.
From abstr. in *Plant Physiol.*, 1957, 32 (Suppl.): xxxiv.

In freshly harvested early onions, pigment formation occurred in macerated bulb tissue stored at a temperature range of −20° C. to 50° C. Pigment formation was optimal at pH 3–3·5 but did not occur at pH levels below 2·8 or above 5·2. Upon storage at 0° C. for a month pigmentation occurred at all levels of pH below 5·2. Pigmentation did not occur in prolonged storage at 0° C. The red pigment formed was similar in general properties to the nitrogenous anthocyanin-betanin of red beets.—Univ. Calif., Berkeley.

3511. Ito, K.
Studies on the bolting of onion. II. On the temperature for flower bud formation.
[Japanese, with English summary 9 lines.]
J. hort. Ass. Japan, 1957, **25**: 243-6, bibl. 5.

Onions with sufficient leaves to initiate bulb division only formed flower buds when the mean temperature was less than 5° C. and the maximum less than 10° C. Those at the same leaf stage, but in which division was retarded by replanting, formed flower buds at a mean of 10° C. and maxima and minima of 13° and 2° C. The length of the low-temperature period needed for initiation was 4–5 days. [For part I see *H.A.*, 27: 1499.]

3512. Ogata, K., Inoue, T., and Murata, T.
Studies on the physiological action of maleic hydrazide on subterranean crops and seeds. 2. Effect of MH on the metabolic pathway in onion bulbs and potato tubers. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1957, **25**: 232-6, bibl. 16, illus.

Two weeks before harvesting, onion leaves were sprayed with 0·25% MH. Five months after harvesting, bulbs from treated plants showed the following differences from controls: (1) lower oxygen uptake in the basal stem, (2) respiratory quotient lower in the basal disc and higher in the scale leaves, and (3) reduction of catalase and dehydrogenase activity in the basal disc.

3513. Isenberg, F. M.
The use of maleic hydrazide on onions.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 343-50, bibl. 4, illus.

If the tops of onions are not more than 50% down and are green, 2 lb. per acre of MH (5 lb. commercial MH-40), applied 10–14 days before harvest, are required for sprout inhibition. If the tops are more than 50% down and are yellowing, 3 lb. per acre (7½ lb. MH-40) are required. The keeping quality of a poor keeping variety like Early Yellow Globe, or of varieties grown under poor conditions, was improved to a greater degree by the sprays than that of a good keeping variety grown under optimum conditions.—Cornell Univ.

3514. Acosta, J. C., and York, T. L.
Control of sprouting in onion bulbs with maleic hydrazide.
Philipp. Agric., 1957, **40**: 525-37, bibl. 8, illus.

MH treatments applied 2 weeks before harvest had no effect on rotting at harvest time or on yield. MH significantly reduced the percentage of sprouting in the field and in store regardless of concentration and method of application. Combined losses due to sprouting and rotting were significantly greater in "common storage" than in cold storage.

3515. Hintze, S., and Åvall, H.
Försök med lök. (**Onion trials: (1) variety, and (2) the effect of maleic hydrazide.**) [English and Esperanto summaries 1 p. each.]
Medd. Trädgårdsförs. Alnarp, **105**, 1957, pp. 19, bibl. 4.

Three varieties were tested and results are discussed. In the MH trials onion plots were sprayed with concentrations of MH-30 varying from 0·125 to 1·00% at 700 litres per ha. Yield was little affected, but ripening was accelerated. Less sprouting but more rotting occurred in the treated onions. At the end of storing (5–7 months) marketable yield was greater at the 0·25, 0·50 and 1·00% concentrations, but some damage was caused by the 1·00% concentration. Unsprayed controls were inferior in keeping quality. The better keeping varieties were more favourably affected by the treatment than those which naturally do not keep so well. The recommendation is made that sprays of 0·25–0·50% MH-30 at 700 litres per ha. should be applied during dry weather 2 to 3 weeks before harvest. By the use of a high pressure spray the amount might be reduced to 400 litres.

3516. Plaisted, R. L., Horner, T. W., and Lana, E. P.
Design and analysis of onion storage trials.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 412-20, bibl. 11.

The factors investigated were size of sample and quality of storage conditions, which should be comparable with those likely to be available to growers. Methods of analysing data were also examined.—Ia St. Coll., Ames.

3517. Yamaguchi, M., Pratt, H. K., and Morris, L. L.
Effect of storage temperatures on keeping quality and composition of onion bulbs and on subsequent darkening of dehydrated flakes.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 421-6, bibl. 8.

Southport White Globe onion bulbs were stored for four months at constant temperatures ranging from 0 to 40° C. Storage at 0, 2·5, and 30° C. resulted in the highest yield of sound onions; 5, 7·5, and 25° provided the next highest; and intermediate temperatures of 10, 15, and 20° gave the lowest yield of both bulbs and dry flakes. With increasing storage temperatures, the content of reducing sugars was lower and that of non-reducing sugars was higher. Free-amino nitrogen content of the bulbs was slightly higher at the higher temperatures. After storage, the bulbs were dehydrated in a commercial plant. Although color differences had been minor immediately after drying, when the flakes were held at 25° C. for 15 months, those made from bulbs previously stored at high temperatures were significantly lighter in color. [Authors' summary.]—Univ. Calif., Davis.

3518. Ogata, K., and Inoue, T.
Studies on the storage of onions. 7. Physiological changes in onion bulbs during storage in enclosed vessels, with special reference to the use of soda lime. [Japanese, with English summary ½ p.]
J. hort. Ass. Japan, 1957, **25**: 237-42, bibl. 10, illus.

After 4 months' storage in desiccators without chemicals onion bulbs were completely disintegrated. Where calcium chloride was used, reducing R.H. to 40–50%, disintegration was less marked. Where soda lime was used, giving approximately the same R.H. as calcium chloride, the oxygen concentration was 0·9% after 4 months and except for a few sprouting bulbs the onions remained in good condition, with very little loss of total sugar and ascorbic acid, but after 4 months they began to deteriorate. Bulbs stored at a controlled temperature of 20° C. disintegrated in 4 months even when the oxygen concentration was maintained at 3·7–4·2%. It is concluded that the average storage period for onions may be prolonged by maintaining an environment with 40–50% R.H. and about 1% of oxygen.

3519. Couto, F. A. d'A.
Symptoms of mineral deficiency in garlic.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 358-65, bibl. 9, illus.

The characteristic symptoms of plant growth and foliar appearance are described for garlic grown in sand culture without N, P, K, Ca, Mg, B, and Zn. The response of plants grown from buds separated from the massive food storage leaf differed somewhat from that of plants developing from the whole clove. The storage leaf supplied some of the nutrient needs of the plant. [Author's summary.]—Univ. rural, Minas Gerais, Brazil.

20. Woolliams, G. E.
Downy mildew of onion and its control in the British Columbia Interior.
Canad. J. Plant Sci., 1957, **37**: 237-44, bibl. 2.

owny mildew (*Peronospora destructor*) first appeared onions grown in the semi-arid British Columbia terior in the abnormally wet year 1942, but has rsisted since, regardless of the weather and despite ry limited systemic overwintering in diseased bulbs. eat treatment of seed mother bulbs in air at 42° C. for ½ hours and in water at 45° C. for 1¼ hours seriously duced the number and height of seed stalks. Among ngicides tested on autumn-planted, spring-planted d seed-crop onions zineb gave the best control, but ly when it was applied at the first sign of mildew in a strict. Maneb and ferbam were less effective, and ptan and NP-1282 (50% pentachlorophenolmercapto-etic acid) were ineffective.—Canada Dep. Agric., mmerland, B.C.

21. Finlayson, D. G.
Further experiments on control of the onion maggot, *Hylemyia antiqua* (Mg.), in the interior of British Columbia.
Canad. J. Plant Sci., 1957, **37**: 252-8, bibl. 11, illus.

periments at two localities in the interior of British lumbia in 1952 and 1953 showed that a seed treat-nt of dieldrin at 0·5 oz. per lb. of seed gave as good ntrol of the onion maggot as any other treatment, as not phytotoxic, and gave the highest yield of rketable onions each year. Lindane, 25% wettable wder, applied three times at 10-day intervals to the surface at 1 lb. of toxicant per acre per application ve consistently good control and high yields, but as more expensive in both labour and materials. lomel at 1 lb. per lb. of seed gave satisfactory control a light infestation but cost 20 times as much as eldrin. DDT at 8 oz. per lb. of seed gave effective ntrol but the bulk of insecticide on the seed caused mming of the seeder. When the amount of DDT as reduced the degree of damage increased. Lindane a seed treatment at 1 oz. per lb. of seed was extremely ytotoxic. The same amount of aldrin applied in a milar manner was phytotoxic but to a lesser degree. uthor's abstract.]—Canada Dep. Agric., Kamloops, C. [For earlier work see *H.A.*, 25: 607.]

Root crops.

(*See also* 3037, 3075, 3089v, 3090q.)

22. Holland, H.
Classification and performance of varieties of red beet.
A.R. nat. Veg. Res. Stat., Wellesbourne, for 1956, 1957, pp. 16-40, bibl. 6, illus.

6 varieties of red beet have been grown at the .V.R.S. and classified. Four categories were divided to eight classes and these were sub-divided into 40 oups, each group containing 'near similar' varieties. sts are given of the varieties in each group and des-iptions are given of the characteristics of the varieties each group. Yield performances are given for one ar only (1954) and bolting performances for two ars. An indication is given of the value of the information obtained for the planning of a breeding programme. [Author's summary.]

3523. Keyworth, W. G.
The use of streptomycin against silvering disease of red beet.
Ann. appl. Biol., 1957, **45**: 215.

A crop of beet badly infected with silvering disease, caused by *Corynebacterium betae*, will produce about 1% infected seed. Soaking the seed for 24 hr. in a 200 p.p.m. streptomycin solution reduced infection in the seedbed from 1% to 0·025% and in the field from 60% to 0·1%. Preliminary tests indicated that a proprietary mercurial dust, at 1% (w.w.), may be as effective as the streptomycin treatment.—Nat. Veg. Res. Stat., Wellesbourne.

3524. Booth, V. H.
Carotene in the leaves of the carrot.
J. Sci. Food Agric., 1957, **8**: 371-6, bibl. 11.

The leaves of carrot plants of red-, orange- and white-rooted varieties contained an average of 119 mg. total carotene per kg. fresh weight, or 546 mg. per kg. dry weight. During 3 successive years the average concentration remained fairly constant throughout the season except for small seedlings and plants with unhealthy foliage, and the standard deviation was only 19 mg. per kg. fresh weight. The concentrations of carotene in the leaves were independent of variety and were not correlated with concentrations in the roots which varied several hundredfold between different varieties.—Dunn nutrit. Lab., Cambridge.

3525. Kedrov-Zihman, O. K., and Koževnikova, A. N.
The effect of liming the soil in conjunction with the use of magnesium and boron on the seed quality of table carrots. [Russian.]
Tr. Vses. n.-i. in-ta udobr., agrotehn. i agropočvoved., 1955, No. 31, pp. 298-313, from abstr. in *Ref. Ž.* (*Biol.*), 1957, No. 6, abstr. 22502.

Over 7 years of pot and small plot trials it was found that liming plus Mg and B applications improved the yielding capacity of carrot seed, and this greater productivity was transmitted from generation to generation. In the 6th year yield from seed obtained with the fertilizers was 26–42% higher than that of the controls, and the sugar content of the roots was also higher.

3526. Burleson, C. A.
The response of carrots to fertilizer applications.
J. Rio Grande Valley hort. Soc., 1957, **11**: 97-8.

One year's data from a replicated carrot fertilizer test indicate that carrots grown on a loam soil in the Lower Rio Grande Valley respond to nitrogen fertilization. In this test 40 lb. N per acre gave maximum production. Carrots did not respond to P and K treatments. [Author's summary.]—Tex. agric. Exp. Stat., Weslaco.

3527. Wilson, J. D.
A distribution pattern of root-knot nematode infestation on muck-grown carrots.
Down to Earth, 1957, **13**(1): 4-7, illus.

Anomalous results in carrot experiments at the Muck

Experiment Station, Celeryville, Ohio, were found to be mainly due to infestation with root-knot nematode (*Meloidogyne hapla*), the incidence of which varied from 1 to 100% in nearly 400 plots. The preceding crop greatly influenced this incidence, plots planted with parsnip and carrot the previous year showing the highest percentage infestation, those with celery and potatoes an intermediate figure, while the lowest percentage was obtained from plots planted with onions and fescue.

3528. TATEBE, T.
Studies on the change of root shape during development in the Japanese radish. [Japanese, with English summary ¼ p.]
J. hort. Ass. Japan, 1957, **25**: 227-31, bibl. 28, illus.

Root development in the Japanese radish takes longer (100 days in autumn) than in the ordinary radish. In the early stages the shape is slender in all varieties. There may be a sudden increase in thickness 41–55 days after sowing, and the typical globular, fusiform or tapering forms develop subsequently according to variety.

3529. BARÁK, K.
Vegetační pokusy s hnojením zemědělských plodin odpadními čpavkovými vodami. II. Vegetační pokus s ranou brukví. (**Experiments on fertilizing agricultural plants with waste ammonia water. II. Experiments on early kohlrabi.**) [Russian and German summaries ⅓ p. each.]
Acta Univ. Agric. Silvic., Brno, Ser. A, 1956, No. 4, pp. 265-71, bibl. 1.

Waste ammonia water containing 0·56 g. N per 100 ml. was applied to pots 10 days before or 10 days after planting kohlrabi seedlings. The pre-planting treatment at 100 ml. per pot resulted in a 285% increase in total yield and 354% increase in tuber yield compared with the controls. For post-planting treatment 40 ml. per pot was the most suitable rate, giving increases of 247% total yield and 334% tuber yield.

3530. MONNBERG, B. M.
Effect of certain chlorinated hydrocarbons on the sugar components of rutabagas and red beets.
Diss. Abstr., 1956, **16**: 1791-2, being *Publ.* 18,427 of 155 pp.

The disaccharide content of swedes and beetroot increased after treatment with lindane, dieldrin and endrin; toxaphene had no significant effect. The amount of monosaccharides present appeared to affect the increase in disaccharide content.—Univ. Wisconsin.

3531. FORBES, A. R., AND KING, K. M.
Control of root maggots in rutabagas, especially in muck soils.
J. econ. Ent., 1957, **50**: 89-91, bibl. 9.

Evidence is presented showing that rates of aldrin and heptachlor effective against fly (*Hylemyia* [*Erioischia*] *brassicae*) on swedes in mineral soils are inadequate in organic soils. In mineral soils a pre-planting band treatment of 5 lb. of toxicant per acre applied as dust, granulated or emulsifiable formulations gave at least 93% reduction in damage. As a spray treatment 2 applications, each of 1·5 lb. of toxicant in 200 gal. per acre, resulted in 99% control.—Ent. Lab., Victoria, B.C. [See also *H.A.*, 27: 498.]

3532. THOMPSON, J. F., AND MORRIS, C. J.
The effect of nitrogen, sulfur and phosphorus deficiencies on the non-protein amino nitrogen content of turnips.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xxiv.

In turnip roots and leaves both P and S deficiencies resulted in increases in glutamine and proline. Nitrogen-deficient plants had less glutamine than normal plants. Phosphorus-deficient plants had an abnormally high level of isoleucine.—U.S. Plant, Soil and Nutrit. Lab., Ithaca.

3533. STONE, M. W., AND FOLEY, F. B.
Control of soil insects on turnips.
J. econ. Ent., 1957, **50**: 143-5, bibl. 3, illus.

From 1954 to 1956 seven insecticides were tested for the control of the seed-corn maggot, *Hylemya cilicrura* (Rond.), the sugar-beet wireworm, *Limonius californicus* Mann., and white grubs in commercial plantings of turnips in southern California. Dieldrin at 2·3 to 3·3 lb. per acre gave the best and most consistent control for one season and partial control for 18 months. Heptachlor and endrin at similar dosages, and aldrin at slightly higher amounts, gave only commercial control (less than 5% of the turnips showing injury) for one season. Isodrin, toxaphene, and DDT at 9 to 11 lbs. per acre did not give adequate protection for this crop. [Authors' summary.]—Ent. Res. Br., agric. Res. Serv., U.S.D.A.

3534. BORG, Å.
Ett bekämpningsförsök mot kålbladstekeln (*Athalia colibri* Christ.) vid ogynnsam väderlek. (**Control of turnip sawfly during unfavourable weather conditions.**)
Växtskyddsnotiser, 1956, No. 5-6, pp. 71-5, illus.

The summer of 1956 was unfavourable for the larval development of turnip sawfly, and sprays applied at the beginning of October gave excellent control. Parathion gave 99·6% mortality and cost less than the other materials. Malathion (at 2 rates) and diazinon (as a dust) also gave very good control, and were preferred for their lower mammalian toxicity. A DDT plus lindane emulsion gave 81·6% mortality. Malathion was also effective on swedes.

Salad crops.

(*See also* 3056, 3604 l, n, t, 3720.)

3535. CRNKO, J.
Se han continuado los estudios sobre producción de semilla de lechuga tipo Imperial. (**Continued investigation on seed production in Imperial lettuce.**)
Idia, 1956, Nos. 106/8, pp. 86.

Very low seed production in Imperial type lettuce is attributed to difficulty of emergence of the inflorescence through the dense heart. This was satisfactorily overcome by splitting the tops with two cuts at right angles. With this treatment the variety Great Lakes gave 167 kg. and Imperial 615 gave 187 kg. of seed per hectare.

536. HOFFMAN, I. C.
Greenhouse trials with Bibb lettuce.
Market Grs' J., 1957, **86**(4): 4, 8, illus.

experiments with Bibb lettuce a night temperature of 2° [F.] was the best of 3 temperatures tested. Spacing t 7×7 in. gave the most economical results. Plants to 2½ in. tall were the best for transplanting.—Ohio gric. Exp. Stat.

537. SKINNER, C. G., AND OTHERS.
Effect of 6-(substituted)thio- and aminopurines on germination of lettuce seed.
Plant Physiol., 1957, **32**: 117-20, bibl. 13.

everal 6-substituted amino- and thiopurines have been ound to stimulate the rate of lettuce seed (Early urled Simpson) germination. The size of the substituent group on the aminopurines is less specific for is activity than is the size of the group on the thiourine; however, the maximum activity in both series s obtained with alkyl chain lengths of 5 to 6 carbons r with an aromatic or heterocyclic substituent connected by a methyl or ethyl group. The stimulation f lettuce seed germination by these compounds is most adily observed in the dark at 30° C. In the presence f light or at a lower temperature (22° C.), lettuce ed germinates so rapidly that only moderate effects f the purine derivatives are observed under these onditions. [Authors' summary.]—Univ. Texas, Austin. ee also *H.A.*, 27: 1527.]

38. HABER, A. H., AND TOLBERT, N. E.
Interactions of kinetin and adenine in the germination of lettuce seeds.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xlix.

inetin at 5×10^{-5}M greatly stimulated germination f far-red treated Grand Rapids and Big Boston White ettuce seeds. Adenine at 5×10^{-5}M slightly stimulated he germination of Boston White, but not Grand apids; at 5×10^{-3}M germination of both varieties was nhibited. Boston White seeds responded to kinetin 5×10^{-8}M in the absence of adenine. Combinations f adenine at concentrations too low to affect germination with 5×10^{-8}M kinetin showed no synergistic ffect on germination.—Oak Ridge nat. Lab., Tenn.

539. HILBORN, M. T., HEPLER, P. R., AND COOPER, G. R.
Plastic films aid control of lettuce diseases.
Me Fm Res., 1957, **5**(1): 11-17, illus.
Effect of polyethylene mulch on soil-borne pathogens of lettuce.
From abstr. in *Phytopathology*, 1957, **47**: 245.

n 1956 a study was made in Maine on the effect of lack and white polythene mulches on bottom rot *Rhizoctonia* sp.), drop (*Sclerotinia* sp.) and slime rot mainly *Pseudomonas* sp.) of lettuce. For these iseases soil treatment with iron Niacide or Terrachlor nd plant spraying with zinc Niacide or captan have hown promise. The mulches completely prevented ontact of the lettuce heads with the soil. Both types of mulch gave good control of slime rot. There was 6·3% disease with the white mulch, 18·2% with the lack and 52·7% in the control. Neither mulch ffected the distribution or size of the root systems, he date of maturity, or the size or weight of the heads.

3540. ZINK, F. W., GROGAN, R. G., AND WELCH, J. E.
Preliminary report on the effect of the amount of seed-borne lettuce mosaic on the subsequent spread of infection.
Veg. Crops Ser., Univ. Calif., Davis **82**, 1956, pp. 2.

The amount of mosaic present in lettuce at harvest was not detrimental to yields when the amount of seed-borne infection had been 0·1% or less [see also *H.A.*, 27: 1529].

3541. COX, R. S.
Control of downy mildew of lettuce in the Everglades.
Plant Dis. Reptr, 1957, **41**: 455-9, bibl. 7.

Excellent control of lettuce downy mildew (*Bremia lactucae*) was obtained over a two-year period with zineb and during one year with maneb. Other materials were either less effective or were phytotoxic. The importance of coverage from the standpoint of disease control and the role phytotoxicity plays in respect to yield and quality are discussed. [From author's abstract.]—Univ. Fla, Belle Glade.

3542. LANGE, W. H., AND OTHERS.
Lettuce root aphid.
Calif. Agric., 1957, **11**(5): 7-8, 15, illus.

The life cycle (Lombardy poplar-lettuce) and the damage caused by the European lettuce root aphid, *Pemphigus bursarius*, are described. Among methods of control tested the most successful was pre-planting soil treatment with parathion at 5 lb. actual chemical per acre. Cultural measures which assist control are also discussed.—Univ. Calif., Davis and Berkeley.

3543. BIBBY, F. F.
Field tests of insecticidal sprays for control of cabbage looper on lettuce.
J. econ. Ent., 1957, **50**: 101-2.

In Arizona a malathion-Perthane mixture at 1 lb. of each compound per acre gave a higher percentage control of cabbage looper (*Trichoplusia ni*) on lettuce than any other insecticide or combination of insecticides tested.—Ariz. Fertilizers, Inc., Phoenix.

3544. MARLATT, R. B., STEWART, J. K., AND BERKENKAMP, B. B.
Storage of lettuce with rib discoloration.
Phytopathology, 1957, **47**: 231-2, bibl. 5.

When rib-discolored head lettuce was stored at 37°, 47° and 50° F. the lesions became dark brown and then black at all storage temperatures. Neither the size nor the number of lesions increased significantly during storage. Lettuce with rib discoloration was more susceptible to decay than was normal lettuce and also had a greater tendency to develop symptoms of another abnormality, pink rib [see *H.A.*, 27: 506]. [Authors' summary].—Ariz. agric. Exp. Stat., Mesa.

3545. UNIVERISTY OF CALIFORNIA.
Lettuce clinic.
Reprinted from *Proc. Conf. Transportation of Perishables*, California, 1956, pp. 20. bibls.

Most of the articles in this reprint concern problems of lettuce transport to market, but there are also articles on market diseases and on the state regulations for lettuce quality. A bibliography of about 50 references to handling, transport and marketing of lettuce in Western U.S.A. is also included.

3546. De Lorenzo, F.
Ricerche sulla cicoria di Treviso. **(Studies on Treviso chicory.)**
Agric. Venezie, 1957, **11**: 267-81, bibl. 8, illus.

In red- and pink-leaved varieties of chicory, leaf colour was intensified and yield increased by irrigation prior to forcing with solutions of ammonium alum and aluminium sulphate, but iron sulphate had no significant effect. Neither N, P, K nor Ca notably affected colour, but yield was increased by N, K and Ca. The pink variety produced slightly heavier plants at harvesting, but after trimming for market the final yield was distinctly higher in the red variety.

3547. Lecrenier, A.
Expérience préliminaire à l'étude de l'absorption du phosphore par la chicorée Witloof au moyen du P^{32}. **(Preliminary experiment on phosphorus absorption by Witloof chicory, using P^{32}.)**
Rapp. Comité Appl. Méth. isotop. Rech. agron. 1955–1956, pp. 84-90, illus.

In a pot experiment accumulation of P was high in the centre of the bud and progressively lower in the outer and older leaves. It was higher in the upper part of the root than towards the tip, and higher in the vascular cylinder than in the cortex. There was an indication that up to maturity P was concentrated mainly in the leaves, whereas subsequently leaf concentration fell and there was a steady rise in the root.

Spinach.

(*See also* 3604o.)

3548. de Vilmorin, R., and Bilquez, N.
Variations de la teneur en acide oxalique chez quelques variétés d'épinards. **(Variations in the oxalic acid content of some spinach varieties.)**
C.R. Acad. Agric. Fr., 1957, **43**: 497-8, bibl. 3.

There was great variation in oxalic acid content within each of 3 spinach varieties analysed. In Géant d'Hiver the oxalic acid content was significantly lower than in Viroflay and Rueil. There was a close correlation between the contents of mineral ash and oxalic acid. It is concluded that varieties low in oxalic acid could readily be obtained by selection.

3549. Crnko, J.
Variedades de espinaca para industria y transporte pueden cultivarse en Mendoza. **(Spinach varieties for canning and direct marketing can be grown in Mendoza.)**
Idia, 1956, Nos. 106/8, p. 87.

Giant Nobel and King of Denmark are smooth varieties for canning, the former very high yielding and the latter late flowering. Bloomsdale and Old Dominion are very high yielding varieties with savoy-like leaves which travel well.

3550. Junges, W.
Jarowisation von Spinat mit verschiedenen Temperaturen und der Einfluss von Dauerlicht während der Jarowisation. **(Vernalization of spinach at various temperatures and the effect of continuous light during vernalization.)**
Gartenbauwiss., 1956, **21**: 429-38, bibl. 22.

Spinach seed was vernalized for periods of 5 days up to 25 days at +3°, +35°, and −10° C. in the dark, and +3° C. in continuous light. Vernalization at 3° C. for up to 15 days accelerated development. At 35° C. and −10° C. vernalization inhibited development, with no significant difference between the 2 temperatures. The effect of weak continuous light during vernalization at 3° C. was not marked, but tended to be inhibitory for periods up to 15 days, after which development tended to be promoted.—Inst. Gartenb., Dresden-Pillnitz.

3551. Bulard, C., and Leopold, A. C.
Growth inhibitors in aging spinach leaves and fruits.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xxvii.

Auxin contents of spinach fruit decreased with maturity. Rather large amounts of inhibitors were found in the male inflorescences after the shedding of the pollen, during maturation of the fruits, and in the leaves around the ripening fruits. The leaves of young seedlings, on the other hand, do not contain inhibitors detectable by the same methods.—Purdue Univ., Ind.

Tomatoes and capsicums.

(*See also* 3041, 3043, 3045, 3059, 3060, 3062, 3070, 3075, 3171, 3202, 3225, 3328, 3329, 3489, 3492, 3604m, u, y, 3605e, h, l, n, o.)

3552. Carncross, J. W. [Editor].
American Tomato Yearbook 1957.
Westfield, N.J., 1957, pp. 40, $2.00.

This is as usefully crammed full as usual with sources of information on all things pertaining to tomatoes with particular reference to the U.S.A. and Canada. It lists Associations, periodicals, journal references and books, and tabulates statistics on production and export. Further it names and gives addresses of those responsible for tomato research in the U.S. and Canada.

3553. Salvioli, R. A.
Uso de la heterosis o vigor híbrido en tomate. **(Use of heterosis or hybrid vigour in tomatoes.)**
Misc. Univ. nac. Tucumán, Fac. Agron. **4**, 1956, pp. 15, bibl. 21, illus.

Techniques for commercial production of F_1 seed are discussed. Where F_2 seed is used, particular attention should be given to selection of parents with fruit ripening at the same time.

3554. McCollum, J. P.
Sampling tomato fruits for composition studies.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 587-95, bibl. 11.

Maturity in so-called "mature green" tomatoes cannot be determined accurately by age, size, or apparent characteristics. The variability in such fruits should be recognized and fully considered in sampling. The time of incipient coloring is a good reckoning point for maturity, especially for the determination of carotenoids. Samples harvested at the turning stage should then be ripened for a given period at a constant temperature of approximately 20° C. Tomatoes to be assayed for carotenoids, ascorbic acid, or sugars should be selected with regard for light exposure. When portions of whole fruits are taken to make a composite sample, approximately equal opposite sectors should be used to compensate for physiological and morphological differences within the fruit. Inasmuch as only a limited number of samples can be taken or analysed at one time, a control should be included with each sampling so that mean values can be adjusted for seasonal variability. [Author's summary.]—Univ. Ill., Urbana.

3555. Vos, N. J.
Variaties van het vitamine C-gehalte in tomaten onder invloed van verschillende factoren. (**Variations in the vitamin C content of tomatoes induced by various factors.**) [English and French summaries ¼ p. each.]
Reprinted from *Voeding*, 1957, **18**: 133-42, bibl. 6, illus.

The ascorbic acid content of outdoor tomatoes was higher than that of glasshouse fruits. Shading glasshouse tomatoes with cheesecloth reduced ascorbic acid content. Tomatoes on the top trusses of greenhouse plants had a higher ascorbic acid level than those on the lower trusses. Ascorbic acid contents increased as the season advanced. The proportion of ascorbic acid was higher in small than in large fruits.—Lab. Tuinbouwpl., Wageningen.

3556. Clutter, M. E., and Miller, E. V.
The relationship between ascorbic acid content and ripening time in the tomato.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xxvii.

A method was developed by which certain physiological constituents could be assayed in the same tomato at various stages of ripening. In this method half of each tomato was analysed in the green state, and the other half was analysed after ripening. Ascorbic acid was found to increase considerably in fruits requiring a short ripening period, but only slightly in those requiring a long ripening period.—Univ. Pittsburgh, Pa.

3557. MacGillivray, J. H., and Clemente, L. J.
Effect of tomato size on solids content.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 466-9, bibl. 6.

In most cases the total solids content of small tomato fruits was higher than that of larger fruits from the same plants.—Univ. Calif., Davis.

3558. Shneour, E. A., and Zabin, I.
On the biosynthetic relationship between lycopene and colorless polyenes in tomatoes.
J. biol. Chem., 1957, **226**: 861-6, bibl. 12.

Methyl-labeled acetate was administered to green, ripening tomatoes, and the colorless polyenes and lycopene were isolated from groups of tomatoes at various time intervals during the course of the ripening period. The specific activity-time curves obtained indicate that lycopene is neither a product nor a precursor of the more saturated polyenes. [Authors' summary.]—Univ. Calif. Medical Center, Los Angeles.

3559. Mackinney, G., Rick, C. M., and Jenkins, J. A.
The phytoene content of tomatoes.
Reprinted from *Proc. nat. Acad. Sci., Wash.*, 1956, **42**: 404-8, bibl. 4.

Phytoene was identified in fruits of an albino mutant from a normal red-fruited tomato stock. The phytoene content was comparable to that of lycopene in normal red fruit.—Univ. California, Berkeley and Davis.

3560. Kern, H., and others.
Der Verteilung der radioaktiven Fusarinsäure in Tomatensprossen. (**The distribution of radioactive fusaric acid in tomato shoots.**) [English summary ½ p.]
Phytopath. Z., 1957, **30**: 31-8, bibl. 10, illus.

Tomato shoots bearing 4 leaves were placed in solutions of labelled fusaric acid at 2 different pH values. Immediately after toxin uptake the fusaric acid contents in the stem were higher at pH 4·3 than at 7·0; in the leaves there was more fusaric acid at pH 7. This distribution corresponded to the distribution of visible necrotic symptoms on the plant. During the 48 hours after toxin uptake much of the fusaric acid was translocated to the leaves, especially at pH 4·3. The relation between the distribution of fusaric acid and its metabolic products and external symptoms disappeared after 48 hours.—Eidg. tech. Hochsch., Zürich.

3561. Palmer, T. P.
Variations in tomato flowers and fruits.
N.Z. J. Sci. Tech., Sect. A., 1957, **38**: 664-8, bibl. 9.

The number of sepals, petals, anthers, and locules were counted on fruits of some plants of Ailsa Craig and Harbinger and U.C. 156. The number of sepals and petals varied from 5 to 8, and fruits had 2 or 3 locules. Each flower usually had the same number of petals and sepals. In the small sample of flowers whose anthers were counted, the number of anthers on Ailsa Craig and Harbinger varied with the number of petals and sepals, but in U.C. 156 this was not the case. In Ailsa Craig, the first flower on a truss was more likely to have 7 sepals and petals, but in Harbinger no such effect was detected. Fruits with three locules were more common later in the flowering season, or on later trusses. Their frequency was increased by removing the laterals as these were formed. [Author's summary.]—Crop Res. Div., D.S.I.R., Christchurch.

3562. Šutov, D. A., and Beljaev, N. V.
The reaction of tomatoes to pre-sowing chilling. [Russian.]
Izv. Moldav. fil. AN SSSR, 1955, No. 6, pp. 101-16, bibl. 15, from abstr. in *Ref. Ž.* (*Biol.*), 1957, No. 6, abstr. 22737.

Alternating warm and cold treatment (18° and 0° C.) of swelling tomato seed of 3 varieties for 2 weeks or cold treatment at 0° C. for 10 days increased yields by 20–40%. The continuous chilling had a particularly favourable effect on early yield. Plants grown from the treated seed showed a high chlorophyll content in the leaves and a high dry matter content in the fruit.

3563. Browning, H. A.
Peat blocks for raising tomato seedlings.
N.Z. J. Agric., 1957, **94**: 477-8, illus.

Results from preliminary trials on raising tomato seedlings in peat blocks have shown that good results may be obtained by adding to a bushel of peat 6 oz. lime and 8–16 oz. of a mixture of 2 parts dried blood, 2 parts superphosphate and 1 part sulphate of potash.

3564. MacGillivray, J. H.
Time study of the transplanting of tomato and celery seedlings.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 470-4, illus.

For pricking out into flats the provision of a moist soil, firming the seedlings by heavy watering and the use of a peg spotting board selected for size of seedling resulted in the greatest savings in working time.—Univ. Calif., Davis.

3565. Nylund, R. E.
The influence of variety, type of transplant, starter solution, and fruit setting spray on yields and fruit size in tomatoes.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 452-8, bibl. 13.

In a 2-year study on the tomato varieties Pritchard and Faribo E (F_1 hybrid of Pritchard × Earliana) the following results were obtained: *The variety* Faribo E produced 54% higher early yields and 42% higher total yields than Pritchard. Average fruit weight was greater for Pritchard. *Transplants:* With both varieties pot-grown plants produced 117% higher early yields and 16% higher total yields than flat-grown plants. Fruit weights were not affected. *Starter solution* (5 lb. 10–52–17 fertilizer in 50 gal. at ½ pt. per plant) had no significant effect on either yield or fruit weight. *Blossom spraying:* Application of para-chlorophenoxyacetic acid (PCPA) at 30 p.p.m. to the first and second flower clusters resulted in 76% higher early yields and 26% larger fruits. Total yields were increased by 8%. In one season the highest-yielding combination of treatments (Faribo E, pot-grown and sprayed with PCPA) gave 237% higher earlier yields and 51% higher total yields than the lowest-yielding combination (Pritchard, flat-grown without blossom spray).—Univ. Minn., St. Paul.

3566. Wittwer, S. H., and Teubner, F. G.
The effects of temperature and nitrogen nitrogen on flower formation in the tomato.
Amer. J. Bot., 1957, **44**: 125-9, bibl. 15, illus.

Tomato seedlings subjected to night temperatures of 10–13° C. for two to three weeks subsequent to the expansion of the cotyledonary leaves in contrast to those grown at 18–21° C. produce flowers when the plant has fewer leaves (nodes) and produce significantly more flowers in the first cluster. Cold exposure at very early stages of growth (seed vernalization) has no effect, while cold treatment of older seedlings will increase the number of flowers in later formed clusters. Plants subjected to 10–13° C. for three or more weeks after cotyledon expansion often produce compound clusters with double or triple the number of flowers. In solution culture high (440 p.p.m.) in contrast to low (55 p.p.m.) levels of nitrogen favor earlier and increased flower formation. Optimum temperature patterns for tomato plants at various stages of development are not fully defined since many interacting factors appear to control flower formation as well as being involved in the subsequent expression of the cold temperature effects. [Authors' summary.]—Michigan State Univ., East Lansing.

3567. Teubner, F. G., and Wittwer, S. H.
Effect of N-arylphthalamic acids on tomato flower formation.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 343-51, bibl. 14, illus.

N-m-tolylphthalamic and other N-arylphthalamic acids, when applied as foliage sprays to tomato plants during flower formation, specifically induced greater numbers of flowers to form. Activity of the N-arylphthalamic acids apparently depended on the presence of a hydrogen on the aryl ring in the position para to the nitrogen. The flower-forming stimulus of single or multiple applications appeared to be independent of variety, and the effectiveness on an individual flower cluster was related to the developmental stage of the plant when treated. [From authors' summary.]—Mich. St. Coll., E. Lansing.

3568. Rappaport, L.
Effect of gibberellins on growth, flowering and fruit set of tomato.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xxxii.

Stem elongation of young plants (4–6 leaves) was increased by gibberellins at concentrations from 2·5 to 40 μg./plant; both fresh weight and dry matter content were significantly increased. Single or repeated applications of 25, 50 and 100 μg./plant hastened flowering by 3 to 10 days without affecting node number up to the first inflorescence. Setting of normal and parthenocarpic fruit was increased by repeated floral sprays containing 1–500 μg./ml. [see also *H.A.*, 27: 1045]. Fruit size and development were unaffected by spray applications to the developing fruit.—Univ. Calif., Davis.

3569. Liverman, J. L., and Johnson, S. P.
Control of arrested fruit growth in tomato by gibberellins.
Science, 1957, **125**: 1086-7, bibl. 8, illus.

Summer dormancy of tomatoes grown under high light and temperature conditions, which can also be induced in winter by far red radiation [see *H.A.*, 27: 526], causes the fruits to remain very small (0·5 to 2·0 mm. in diameter). Spraying the dormant fruits with gibberellins, 5 times on alternate days, resulted in an appreciable number of enlarged fruits. Fifteen days after the beginning of treatment 46% of the fruit sprayed with 25 μg./l had broken dormancy, and 23% of that sprayed with 250 μg./l, compared with 7% in the controls. The higher concentration appeared to be slightly toxic. The mechanism of action of the gibberellins in breaking dormancy is being investigated.—Texas agric. mech. Coll. System, College Station.

3570. HUANG, H., AND HUNG, L.
The set and fruit size of tomatoes as affected by the application of para-chlorophenoxy-acetic acid during cool seasons. [Chinese with English summary 1½ pp.]
Mem. Coll. Agric. nat. Taiwan Univ., 1956, **4**(3): 70-93, bibl. 16.

The effect of 3 concentrations of PCA on the Pritchard tomato was studied during the winter in greenhouse trials. PCA treatment increased fruit size, and also hastened growth and ripening, but fruit set was decreased.

3571. WEDDING, R. T., HALL, B. J., AND LANCE, E.
Effects of fruit-setting plant growth regulator sprays on storage qualities of tomato fruits.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 459-65, bibl. 7.

Tomato fruit of the Pearson variety grown in coastal San Diego County during the spring months and treated with fruit-setting sprays of Na-4-chlorphenoxy-propionic acid and N-meta tolylphthalamic acid tended to ripen more rapidly when stored at 20° C. than fruit from untreated vines in the same plots. This rapid maturation was indicated by increased color development and more rapid softening of the tissues, as well as by changes in total acidity and cloudiness. There is some evidence that the hormone-treated fruits are physiologically more mature at the time of harvest than untreated ones. Similar treatments applied to Pearson vines during the fall months did not result in any significant differences in the storage performance of the resulting fruit. [Authors' summary.]—Univ. Calif. Citrus Exp. Stat., Riverside, and agric. Ext. Serv., San Diego, Calif.

3572. HEPLER, P. R., HILBORN, M. T., AND COOPER, G. R.
Plastic film mulches may help tomato production.
Me Fm Res., 1957, **5**(1): 28-30, illus.

The effects of mulching with black or white polythene film, and with hay or sawdust were studied on 3 tomato varieties. Weed control under the black polythene was excellent. In sawdust and hay plots reduced growth and N starvation were observed, and yields were lower than those of the controls. On polythene-mulched plots yields were slightly higher than on the control plots.

3573. VITTUM, M. T., AND TAPLEY, W. T.
Spacing and fertility level studies with a paste-type tomato.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 323-6, bibl. 2.

In these experiments at Geneva N.Y. the largest yields per acre of Red Top tomatoes resulted from a combination of close spacing, 10 sq. feet per plant, and high fertility level.

3574. ZAV'JALOV, N. V.
The use of bacterial fertilizers for tomatoes. [Russian.]
Sad i Ogorod, 1957, No. 4, pp. 27-9.

Placing organo-mineral granules in the planting holes and dipping the roots of tomato transplants into a water solution of phosphoro-bacterin+silicate bacteria increased yields by 46% above that of the controls. Azotobacterin was ineffective in these trials. The organo-mineral granules were made of a mixture containing 60% by weight of compost, 10% fresh cow manure and 30% superphosphate, ammonium sulphate and a potassium salt.

3575. OTEY, G. W.
Response of tomatoes to the organic fertilizer and soil amendment, Fertilaid.
J. Rio Grande Valley hort. Soc., 1957, **11**: 105-6, bibl. 4.

Fertilaid contains 40% humus and 4–2–0 of N, P, K plus minor elements. The addition of 300 lb. Fertilaid at a cost of $10.00 per acre to the standard fertilizer (13–39–0 at 300 lb. plus top dressing of ammonium nitrate at 150 lb.) increased the total yield of tomatoes by 4,328 lb. per acre, or 61% over the control that received standard fertilizer alone.—Rio Farms, Inc., Edcouch, Tex.

3576. WOOLLEY, J. T., AND BROYER, T. C.
Foliar symptoms of deficiencies of inorganic elements in tomato.
Plant Physiol., 1957, **32**: 148-51, bibl. 8.

A key to foliar symptoms of mineral deficiencies with tomato is presented. This is a distinct aid in characterizing malnutrition conditions under controlled solution culture as well as in the field. Early recognition of such situations, augmented possibly by foliar analyses, should be of service in agricultural practice. [Authors' summary.]—Univ. Calif., Berkeley.

3577. GÄUMANN, E., BACHMANN, E., AND HÜTTER, R.
Über den Einfluss der Eisenernährung auf die Lycomarasmin-Empfindlichkeit der Tomatenpflanzen. **(The effect of iron nutrition on the susceptibility of tomato plants to lycomarasmin.)** [English summary 1½ pp.]
Phytopath. Z., 1957, **30**: 87-105, bibl. 13.

In tomato plants grown in culture solution at different levels of iron nutrition it was shown that in Fe-deficient plants the deficiency symptoms were aggravated by lycomarasmin. In plants with excess Fe lycomarasmin accentuated toxicity symptoms. It is concluded that as tomato plant reactions to lycomarasmin are altered by relatively small variations in Fe content adequate Fe nutrition must be an important factor in disease resistance. Moreover, the small quantities of metal which affect plant susceptibility to lycomarasmin can penetrate into the leaf from spray applications; thus plant protective sprays of heavy metals (Cu or Fe) may counteract the toxin effect as well as acting fungicidally. —Eidg. tech. Hochsch., Zürich.

3578. CANDELA, M. I., AND HEWITT, E. J.
Molybdenum as a plant nutrient. IX. The effects of different molybdenum and manganese supplies on yield and on the uptake and distribution of molybdenum in tomato plants grown in sand culture.
J. hort. Sci., 1957, **32**: 149-61, bibl. 20, illus.

Market King tomato plants were grown in sand culture at 2 levels of Mo and 3 levels of Mn. Yields were reduced by Mo deficiency, and were further reduced by excess Mn at the low Mo level. Molybdenum concentration ranged from below 0·005 p.p.m. to 0·07 p.p.m. in Mo-deficient plants and from 0·11 p.p.m. to 2·6 p.p.m. in normal plants. Mid-stem leaves contained, in general, higher Mo concentrations per unit of dry weight than did old or young leaves. Terminal leaflets of old and mid-stem leaves contained less Mo than the largest median leaflets of the same leaves. Stem contents of Mo were higher than midrib, petiole or root contents. Increasing Mn levels caused highly significant increases in the Mo concentration in most parts of plants grown at both Mo levels. It is concluded that the unfavourable effects of excess Mn on Mo-deficient plants are not due to changes in Mo content.—Long Ashton Res. Stat., Bristol.

3579. Gates, C. T.
The response of the young tomato plant to a brief period of water shortage. III. Drifts in nitrogen and phosphorus.
Aust. J. biol. Sci., 1957, **10**: 125-63, bibl. 17.

The drifts in nitrogen and phosphorus for the whole plant, its principal parts, and the laminae and petioles of the individual leaves are considered for tomato plants subjected to a brief period of wilting after they had developed 8 easily manipulable leaves. The aim was to estimate some of the internal factors which contributed to the growth response previously described [for parts I and II see *H.A.*, 26: 703, 704]. Treatment effects on nitrogen and phosphorus content were the resultant of two differing trends, that during and that subsequent to wilting, but were expressed most strongly in the nutrient uptake of the more actively growing organs. During wilting, the uptake of nitrogen and phosphorus was markedly reduced and both nutrients were translocated from the laminae to the stem. Upon re-watering, active uptake of both nutrients was resumed and both passed preferentially to the laminae rather than to the stem. Phosphorus was the more labile of the two nutrients and wilting depressed phosphorus content more than nitrogen content. It was concluded that this depression was initiated relatively early in the drying cycle and preceded the effect on dry weight. However, the uptake of phosphorus upon re-watering was less rapid than that of nitrogen. All laminae shared in the drastic effects of water shortage but, whilst the upper laminae suffered the greatest absolute depression, they nevertheless retained the greatest capacity to resist the depressing effects of water shortage. The response of the younger parts points to their playing a dominant role in maintaining the organization of the plant when exposed to water stress. Internal factors were primary in all these responses and factors of external supply were secondary. A mechanism is suggested for the development of nitrogen-rich plants under a succession of moisture shortages. [Author's summary.]

3580. Hockey, K. C.
Manuring and watering glasshouse tomatoes by trickle irrigation.
N.Z. Comm. Gr, 1957, **12**(11): 3-5.

The principles of trickle irrigation are discussed. In a trial at Massey College the use of trickle irrigation with nutrient solutions increased tomato yields from 3,826 lb. to 5,301 lb. per 448 plants, compared with orthodox application of water and fertilizers.

3581. Kattan, A. A., Stark, F. C., and Kramer, A.
Effect of certain preharvest factors on yield and quality of raw and processed tomatoes.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 327-42, bibl. 21.

Fruit quality was not appreciably affected by the amount of N, P, K, Mg or B applied, provided minimum requirements were met. It was found to depend on climatic conditions during harvest and inherited varietal characters. There are consistent varietal differences indicative of the inheritance of colour intensity and the future in this respect lies with the breeder. Chelated calcium sprays proved favourable to colour retention. Relationships between colour of raw product and colour of canned juice and tomatoes are discussed and may be useful in predicting quality.—Univ. Md., College Park.

3582. Workman, M., Pratt, H. K., and Morris, L. L.
Studies on the physiology of tomato fruits. I. Respiration and ripening behavior at 20 degrees C as related to date of harvest.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 352-65, bibl. 25.

Observations over 3 years showed that, although preharvest chilling affected the rate of ripening and market quality of tomatoes harvested in the mature-green state, it had little or no apparent effect on the gross rate or pattern of respiration. Respiration studies such as this would seem to offer little promise of elucidating the mechanism of chilling injury.—Univ. Calif., Davis.

3583. Maynard, D. N., Barham, W. S., and McCombs, C. L.
The effect of calcium nutrition of tomatoes as related to the incidence and severity of blossom-end rot.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 318-22, bibl. 16.

The incidence and severity of blossom-end rot were found to decrease significantly as the calcium levels in the sand culture solution were raised. Calcium content of normal fruit was significantly higher than that of blossom-end rot affected fruits. No variety differences in severity of attack were found. Potassium content of fruit was not affected by variety, calcium level or presence of blossom-end rot.—N.C. St. Coll., Raleigh.

3584. Boyle, J. S., and Wharton, D. C.
The experimental reproduction of tomato internal browning by inoculation with strains of tobacco mosaic virus.
Phytopathology, 1957, **47**: 199-207, bibl. 13, illus.

The incidence of internal browning of tomato fruits could not be correlated with rate of fertilizer application, disease control programmes or variety. Strains of TMV were isolated consistently from internally browned fruit and from foliage of plants that had produced internally browned fruit. A negative correlation was observed between the early appearance of mosaic symptoms and the ultimate appearance of internally browned fruit. Inoculation of young tomato plants h TMV did not result in internal browning but nts inoculated when the fruit was beginning to en produced up to 93% of internally browned fruit. is concluded that internal browning is a shock ction resulting from virus invasion of the fruit lowed by a hypersensitive response of the host.— St. Univ., University Park.

85. Doering, G. R., Price, W. C., and Fenne, S. B.
Tomato rosette caused by a virus complex.
Phytopathology, 1957, **47**: 310-11, bibl. 4, illus.

e disease has been proved to be due to a combination the tomato-rosette strain of tobacco mosaic virus d a new unstable virus to which the name "shoe- ing" has been given. Symptoms produced by the arate viruses in tomato and tobacco are described.

86. Selman, I. W., and Grant, S. A.
The influence of temperature and daylength on spotted wilt virus disease of tomato.
Ann. appl. Biol., 1957, **45**: 312-17, bibl. 7.

e responses of young tomato plants to infection h tomato spotted wilt virus were studied at constant peratures. The plants were grown in nutrient utions and given 3 daylength treatments. The gth of the incubation period was positively correlated h temperature and a regression equation for this tionship is given. The calculated temperature at ch this period becomes infinite is 6·7° C. The perature coefficient (Q_{10}) varied from 1·7 to 2·9. weight determinations were made of stems, leaves roots. In healthy plants the leaf/stem ratio erally fell with rise of temperature and the shoot/ t ratio rose. Infection changed these ratios, which nterpreted as indicating that it interfered with plies of carbohydrate to the growing regions. temic symptoms are described for plants raised at °, 18·3°, 23·9°, and 29·4° C. Changes in day- gth did not affect the systemic symptoms or incuba- period. With a 9 hr. day at 29·4° C., the virus tent of sap was significantly lower than with 12 or hr., and with a 12 hr. day was significantly higher n with a 15 hr. day. [Author's abstract.]—Wye ll.

87. Simons, J. N.
Effects of insecticides and physical barriers on field spread of pepper veinbanding mosaic virus.
Phytopathology, 1957, **47**: 139-45, bibl. 7, illus.

ld studies were carried out on the spread of pepper nbanding mosaic virus, using nightshade as the mary source, capsicum as a test plant and naturally- urring aphids as vectors. A distance of 150 ft. ween capsicum plots effectively limited virus nsmission. Sprays of demeton or parathion applied the plots did not give control. Parathion sprayed nightshade significantly reduced virus spread. nflower barriers also significantly reduced virus ead, but demeton sprays applied to the barriers not improve their effect further. A statistically nificant correlation was found between row position the amount of infection in sunflower-protected as.—Everglades Exp. Stat., Belle Glade, Fla.

3588. Šutić, D.
Bakterioze crvenog patlidžana. **(Bacterial diseases of tomatoes.)** [English summary 6 pp.]
Posebna Izd. Inst. Zašt. Bilja **6**, 1957, pp. 66, bibl. 45, illus.

In an investigation on diseased tomato plants in Yugoslavia during the period 1951–1955, 34 strains of bacteria were isolated and identified as follows: (1) 19 strains of *Pseudomonas* [*Xanthomonas*] *vesicatoria*, (2) 11 strains of *P. tomato*, (3) 2 strains of *Corynebacterium michiganense*, (4) a new species of *Pseudomonas* named *gardneri*, and (5) a new variety of this species, *capsici*, which was isolated from peppers but was pathogenic to tomatoes when artificially infected. For the control of bacterial diseases use of healthy seed and studies on resistance are recommended.

3589. Wilson, J. D., Black, D. T., and Irons, F.
Anthracnose . . . can the infection be controlled by soil treatment?
Fm Home Res. Ohio, 1957, **41**(304): 3, 13-15, bibl. 3.

While both zerlate and manzate at 3 lb. per acre in each of 8 foliar sprays at 8-day intervals gave excellent control of anthracnose of tomato in experiments at Bowling Green, Ohio, the mixing of various foliar and soil fungicides with the surface 6 in. of soil did not. Among substances thus used were zerlate, manzate, captan, vapam, EDB, mylone, Coro SDD, thiram and nabam.

3590. Pelletier, E. N.
The value of field application of fungicides for reduction of post-harvest tomato anthracnose losses.
Diss. Abstr., 1956, **16**: 1990, being *Publ.* 18,867 of 96 pp.

Manzate and a mixture of tri-basic copper and ziram applied at 7-day intervals gave the greatest reduction of losses due to anthracnose [*Colletotrichum phomoides*] in tomatoes stored at 45° F. Direct laboratory bioassay of 76 compounds revealed several materials more effective than the best field treatment, but field efficiency was not always correlated with laboratory efficiency, for which temperature effects were found to be partially responsible.—Purdue Univ.

3591. Williams, P. H., and Hack, J.
The effect of certain soil treatments on *Didymella* stem rot of tomatoes. Part I. Glasshouse experiments.
Ann. appl. Biol., 1957, **45**: 304-11, bibl. 4.

When tomatoes were planted in steamed soil inoculated with spores of *Didymella lycopersici* Kleb., a large proportion became infected, but very few became infected in unsteamed soil similarly inoculated. In soil treated with formalin and subsequently inoculated the number of diseased plants was about half that in steamed soil. Reinfecting steamed soil with soil micro-organisms before inoculation with *D. lycopersici* reduced the amount of disease. Covering steamed soil with a layer of maiden loam filtered out a large proportion of *D. lycopersici* spores applied in water suspension and reduced the amount of disease. Addition of stable manure either before or after steaming did not affect the number of diseased plants. Steamed soil remained susceptible to infection by *D. lycopersici* for [at least] 4 months [in the absence of plants]. *D. lycopersici* survived in a glasshouse soil over the winter, but the number of diseased plants [the following year] was small. Cultivation may lessen the amount of disease by burying most of the infected surface layers of the soil. The peak of infection under glass occurred in May. The amount of disease and the yield were correlated, but with severe infection the yield varied with the time of infection and the distribution of diseased plants. [Authors' abstract.]—Glasshouse Crops Res. Inst., Littlehampton.

3592. WAGGONER, P. E., AND DIMOND, A. E.
Altering disease resistance with ionizing radiation and growth substances.
Phytopathology, 1957, **47**: 125-30, bibl. 17.

In comparative studies on the effects of X-radiation and growth substances upon resistance of *Fusarium* wilt of tomato, shoot irradiation decreased disease resistance of highly susceptible (Bonny Best), multiple-gene-resistant (Pritchard), and single-gene-resistant (Pan American) tomatoes. Root irradiation 2 to 4 days before inoculation increased resistance, as also did NAA. IAA increased resistance in non-irradiated plants and largely prevented any loss of resistance due to whole plant irradiation at inoculation time or to treatment with MH. Exposure of plants to solutions of metabolic inhibitors before and after root irradiation did not prevent the appearance of resistance. Shoot irradiation decreased the resistance of both stem and shielded roots. Root irradiation did not induce resistance in the stem or in non-irradiated roots after the irradiated roots had been removed. Resistance induced by root irradiation or treatment with NAA reached a maximum after 2 to 8 days and then disappeared; these time changes in resistance were dependent on temperature. Decreases in resistance caused by shoot irradiation and by MH also changed with time.—Conn. agric. Exp. Stat., New Haven.

3593. TOUZEAU, J.
Le blanc du piment (*Oidiopsis taurica*). Expérimentation de lutte en 1956 en Tunisie. (**Powdery mildew of capsicum. Control experiments in 1956 in Tunisia.**)
Fruits et Prim., 1957, **27**: 60-74, illus.

Capsicum plants were effectively protected from powdery mildew attack by sulphur, either alone or with karathane or permanganate. Lindane emulsion is recommended for control of insect pests as it also shows some fungicidal action against powdery mildew. Treatment early in the season was of little use but spraying should be continued until the end of the harvesting period.

3594. SINCLAIR, J. B., BROWN, R. T., AND MARTIN, W. J.
Occurrence of tomato late blight and effect of various fungicides on tomato yields in Louisiana.
Plant Dis. Reptr, 1957, **41**: 657-60, bibl. 1.

In the absence of late blight infection on Louisiana spring tomatoes the use of various organic fungicides recommended for control of this disease gave a significantly higher yield of marketable fruits when compared with Copper A [copper oxychloride], at the rates used. A tendency for an increase in U.S. No. 1 fruits and the number of culls was noted in plots sprayed with the organic fungicides. Whether this difference would be marked under severe late blight conditions is not known. The presence of early blight and its possible effect on yields was not considered important since all the fungicides used gave good control of this disease. It might appear from these data that Copper A was phytotoxic, but this cannot be concluded with certainty. [Authors' discussion and conclusions.]—La agric. Exp. Stat., Baton Rouge.

3595. JOSHI, N. C., AND SAXENA, M. P.
A serious tomato fruit rot from Ajmer and method of its control.
Sci. and Cult., 1957, **22**: 682-3, bibl. 3, illus.

Morphological studies and pathogenicity tests suggest that *Rhizoctonia solani* was the organism responsible for a serious fruit rot of tomatoes found in the Ajmer district in January, 1956. It is considered that keeping the fruits away from the soil surface should check the spread of the disease.—Bot. Dep., Govt Coll., Ajmer.

3596. BUTLER, E. E.
Effectiveness of copper-treated paper wrappers in preventing spread of *Rhizopus nigricans* in mature-green tomatoes.
Plant Dis. Reptr, 1957, **41**: 474-7, bibl. 8.

The use on tomatoes of Hartman wraps, which contain basic copper carbonate and small amounts of basic copper sulphate and copper hydroxide, failed to check the spread of *Rhizopus nigricans* from fruit to fruit any better than untreated wraps. With the exception of two *Phytophthora* spp. the copper-treated wraps proved equally ineffective against other organisms in laboratory tests.—Univ. Calif., Davis.

3597. BAKARCIC, M., AND FERNÁNDEZ VALIELA, M. V.
Control de la viruela del tomate. (**Control of tomato leaf spot.**)
Idia, 1956, Nos. 106/8, p. 186.

The variety Rutgers was fairly resistant to *Septoria lycopersici*. Infection was reduced from 50% to 60% by 5 applications of a copper fungicide at 15–20-day intervals from transplanting onward. Equally good results followed treatments given after rain.

3598. PARFILOVA, M. E.
The effectiveness of copper oxychloride dust for the control of tomato diseases. [Russian.]
Nauč. zap. L'vovskogo s.-h. in-ta, 1955, **5**: 172-5, from abstr. in *Ref. Ž.* (*Biol.*), 1957, No. 6, abstr. 22975

Under humid conditions (Lvov region in the Ukraine dusting 4 times with copper oxychloride reduced the incidence of septoriosis [*Septoria lycopersici*] to 1% compared with 35% in the controls, and that of frui rots to 1·4% compared with 12%. The fruit of the treated plants contained 8·1% more malic acid an 9·6% more ascorbic acid than that of the controls.

3599. SAUER, M. R., AND GILES, J. E.
Effects of some field management systems on root knot of tomato.
Nematologica, 1957, **2**: 97-107, bibl. 12.

The effects of 4 systems of field management o *eloidogyne javanica* infestation of tomatoes were udied over 3 seasons, 1951–54. Growing of sus- ptible tomatoes in the same soil year after year gave uniform severe infestation which usually depressed elds. Growing of nematode-resistant hybrid tomatoes sured good yields but did not reduce the nematode opulation to make the land suitable for susceptible ops, since the resistance varied from plant to plant, ermitting some reproduction of the nematodes. esistance was decreased by repeated planting. Clean llow for 3 years reduced nematode infestation gnificantly. Fallowing had the effect of increasing eld quite apart from any increase due to reduced ematode attack. When the fallow was broken by a sceptible crop the nematode population increased pidly. Summer fallow with winter barley cover crop ve the same result as complete clean fallow. [From thors' summary.]—Commonw. Res. Stat., Merbein, ict.

00. Peacock, F. C.
Studies on root knot nematodes of the genus *Meloidogyne* in the Gold Coast. Part II. The effect of soil moisture content on survival of the organism.
Nematologica, 1957, **2**: 114-22, bibl. 4.

laboratory and greenhouse experiments to determine e limits of tolerance of the eelworm to soil moisture, ot-knot eelworm larvae and egg-masses were shown be highly susceptible to death by desiccation. gg-masses were also somewhat intolerant of excessive oisture. The critical moisture content appeared to 3–4% (10 to 13% of saturation), below which larvae d eggs were unable to survive, except where protected plant material. In field experiments it was shown at simple cultivations during the dry season, Novem- er–February, were sufficient to reduce soil moisture or below this critical level, and that a practical easure of control (as determined by assessing the verity of attack on the subsequent tomato crop) did ccur. [From author's summary.]—Univ. Coll. Gold ast, Achimota.

01. Oteifa, B. A., and El-Gindi, D. M.
Effect of irrigation frequency and size of tomato seedlings on root knot index.
Plant Dis. Reptr, 1957, **41**: 605-7, bibl. 2.

ith weekly irrigation treatments tomato plants were ore severely infested by *Meloidogyne* sp. than with weekly treatments. Seedling size at transplanting as not related to the degree of nematode injury.— airo Univ., Giza.

02. Wene, G. P.
Commercial control of the tropical mite on tomatoes and the two-spotted spider mite on strawberries.
J. Rio Grande Valley hort. Soc., 1957, **11**: 108-9, bibl. 1.

he tropical mite, *Tetranychus marianae*, has recently en recorded as a serious pest of tomatoes in the Lower io Grande Valley of Texas. Very heavy infestations ere effectively controlled by demeton at 0·25 lb./acre d by trithion at 0·5 lb./acre, but not by parathion. n strawberries *T. telarius* was controlled by phosdrin ut limited residual effectiveness made re-treatment cessary.—Tex. agric. Exp. Stat., Weslaco.

3603. Miller, L. A., Miles, J. R. W., and Sans, W. W.
DDT and DDD residues on tomatoes processed into juice.
Canad. J. Plant Sci., 1957, **37**: 288-91, bibl. 3.

Experiments were carried out in 1954 and 1955 in which tomatoes that were field-treated with DDT or DDD were processed into juice by commercial procedures, and components were analysed for residues of these compounds. In 1954, four sprays were applied of DDT at 1·25 and 2·5 lb. per acre and of DDD at 1·5 lb. per acre; in 1955, six sprays of DDT and of DDD at 1·5 lb. and at 3·0 lb. per acre. Residues in the juice did not exceed 0·13 p.p.m. Approximately 80% of the residues were removed during washing and most of the remainder was concentrated in the waste. [Authors' abstract.]—Canada Dep. Agric., Chatham, Ont.

Noted.

3604.

a Agrawal, J. S., and Singh, S. P.
Nucellar polyembryony in *Momordica charantia* Linn.
Sci. and Cult., 1957, **22**: 630-1, bibl. 6, illus.
But only the fertilized embryos appear to reach maturity.

b Bassett, D. M.
Soil and crop response to synthetic soil conditioning chemicals.
Diss. Abstr., 1956, **16**: 1761, being *Publ.* 18,456 of 123 pp.
Small to moderate yield increases shown by several [unspecified] vegetable crops.

c Blagoveščenskij, V. V.
An interesting case of bulb formation in the inflorescence of the common onion. [Russian.]
Bot. Žurnal, 1956, **41**: 1171-2, bibl. 4, illus.

d Caesar, W.
Erfahrungen im Anbau von Mandelzypergras (*Cyperus esculentus* L.) unter besonderer Berücksichtigung des Arbeitsaufwandes bei der Ernte. **(Notes on growing *Cyperus esculentus*, with particular reference to labour requirements at harvest.)**
Dtsch. Gartenb., 1957, **4**: 127-9.
Machinery and man-hour requirements for harvesting.

e Camargo, L. de S.
Novas linhagens de repôlho e couve-flor para o estado de São Paulo. **(New cabbage and cauliflower varieties for São Paulo state.)** [English summary ¾ p.]
Bragantia, 1956, **15**: 315-28, bibl. 18, illus.
Selection of strains of Louco cabbage and of Campinas, Early Benares and Teresópolis cauliflowers for the warm season is described.

f CRANE, R. I., AND SCIARONI, R. H.
Artichoke packing made easier.
Veg. Crops Ser., Univ. Calif. Davis **85**, 1956, pp. 9, illus.
Globe.

g CRANE, R. I.
Mechanical stake drivers and stringers for snap beans.
Veg. Crops Ser., Univ. Calif. Davis **84**, 1956, pp. 7.
Costs of various mechanical and hand methods compared.

h CROCKER, A. J.
Rockmelons in the Central Burnett.
Qd agric. J., 1957, **83**: 132-4, illus.
Cultural practices.

i EMMERT, E. M.
Black polyethylene for mulching vegetables.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 464-9.
See also *H.A.*, 26: 2748 and 27: 576n.

j ERICKSON, H. T., AND GABELMAN, W. H.
The effect of distance and direction on cross-pollination in onions.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 351-7, bibl. 5.
In F_1 hybrid seed production.

k FAWCETT, C. H., SPENCER, D. M., AND WAIN, R. L.
Investigations on fungicides. II. Aryloxy- and arylthio-alkanecarboxylic acids and their activity as fungicides and systemic fungicides.
Ann. appl. Biol., 1957, **45**: 158-76, bibl. 23.
Including tests as systemic fungicides against *Botrytis fabae* and *Alternaria solani*. [For part I see *H.A.*, 26: 1633.]

l FOSTER, R. E., AND VAN HORN, C. W.
Lettuce seed production in Arizona.
Bull. Ariz. agric. Exp. Stat. **282**, 1957, pp. 22, illus.
Including notes on the lettuce seed certification scheme.

m GERALDSON, C. M.
Control of blossom-end rot of tomatoes.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 309-17, bibl. 24, illus.
See *H.A.*, 26: 2842 and 27: 546.

n HUYSKES, J. A.
Praktijkproeven met witlof 1954–1955. **(Field trials with chicory 1954-1955.)** [English summary 13 lines.]
Meded. Dir. Tuinb., 1957, **20**: 378-85, illus.
Selected types classified according to season.

o JONES, H. A., MCLEAN, D. M., AND PERRY, B. A.
Breeding hybrid spinach resistant to mosaic and downy mildew.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 304-8, bibl. 11.
Method of work and the production of Early Hybrid 7 spinach [see also *H.A.*, 27: 1535].

p KELSEY, J. M.
Virus sprays for control of *Pieris rapae* L.
N.Z. J. Sci. Tech., Sect. A, 1957, **38**: 644-6, bibl. 6.
Possibility of infecting *P. rapae* on cabbage demonstrated.

q KHAN, N. A., AND BAKER, B. E.
The amino-acid composition of some Pakistani pulses.
J. Sci. Food Agric., 1957, **8**: 301-5, bibl. 18.
Including bean (*Vicia faba*) and lentil seeds.

r LAMBERT, E. B.
Methods of preparing mushroom compost in the United States and some underlying "principles".
M.G.A. Bull., 1957, No. 90, pp. 201-9, illus.
See also *H.A.*, 27: 576w.

s LAMM, R., HINTZE, S., AND ÅVALL, H.
Klassificerande sort- och stamförsök med köksväxter 1954–1956. **(Vegetable variety tests 1954-1956.)** [English and Esperanto summary 2 pp. each.]
Medd. Trädgårdsförs. Alnarp **106**, 1957, pp. 28.
Broad beans, tomatoes, peas and mange-tout peas, white cabbage, parsley and winter forcing radish.

t LORENZ, O. A., ZINK, F. W., AND HOWARD, F. D.
Nutrient survey of lettuce fields in Salinas Valley 1954.
Veg. Crops Ser., Univ. Calif. Davis **87**, 1956, pp. 15.

u MEDINA, L. H.
Selección de variedades de pimiento industrial. **(Selection of capsicum varieties for processing.)**
Idia, 1956, Nos. 106/8, p. 280.
For high yield, quality and disease resistance.

v MOORE, J. F.
Chinook, a new variety of green sprouting broccoli.
Stats Circ. Wash. agric. Exp. Stats **296**, 1956, pp. 2.
Developed for western Washington conditions.

w NAKAGAWA, H., KAMIMURA, S., AND SATO, I.
Studies on chinese cabbage breeding. I. Hybrid vigor between varieties and strains.
[Japanese, with English summary ½ p.]
Reprinted from *Reps Tohoku nat. agric. Exp. Stat.* **4**, 1955, pp. 133-51, bibl. 11.

x ODLAND, M. L., AND NOLL, C. J.
Vegetable variety trials 1956.
Prog. Rep. Pa agric. Exp. Stat. **166**, 1957, 1 folded sheet.
Cabbage, beet, winter squash, carrot, egg-plant, snap bean and pepper varieties.

y Poole, C. F.
Improvement in tomato ascorbic acid content.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 443-51, bibl. 5.
Through breeding in Hawaii.

z Price, C. A.
A new thiol in legumes.
Nature, 1957, **180**: 148-9, bibl. 6.
Named phaseothione; occurs in red kidney beans, etc., in place of glutathione.

605.

a Quebec. Information and Research Service.
Vegetable Protection Guide. [French and English.]
Quebec Dep. Agric., 1957, pp. 20 French, 20 English.
Insecticides, fungicides, herbicides for vegetables, strawberries and raspberries in Quebec.

b Raacke, I. D.
Protein synthesis in ripening pea seeds. 1. Analysis of whole seeds. 2. Development of embryos and seed coats. 3. Study of the pods.
Biochem. J., 1957, **66**: 101-10, bibl. 28; 110-13, bibl. 10; 113-16, bibl. 9.

c Raha, C. R.
Isolation of d-mannitol from the bulbs of *Allium cepa*.
Sci. and Cult., 1957, **22**: 637, biol. 2.

d Reid, W. J., Jr., and Cuthbert, F. P., Jr.
Control of caterpillars on commercial cabbage and other cole crops in the south.
Fmrs' Bull. U.S. Dep. Agric. **2099**, 1957, pp. 24, illus.

e Richardson, R. W., Jr., and Alvarez L., E.
Pollination relationships among vegetable crops in Mexico. I. Natural cross-pollination in cultivated tomatoes.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 366-71, bibl. 1.

f Sanborn, B. G.
Results of seed tests for 1956.
Bull. N. H. agric. Exp. Stat. **434**, 1956, pp. 34.
Includes reports on germination tests of vegetable seed submitted by some 40 firms.

g Suchá, M.
Pokusy s některými retardačními látkami na klíčícím hrachu (*Pisum sativum*). (**Experiments with some growth retarding substances on germinating peas.**) [Russian and English summaries ¼ p. each.]
Acta Univ. Agric. Silvic., Brno, Ser. A, 1956, No. 4, pp. 211-23, bibl. 17, illus.
Effects of MH, α-naphthylacetic methylester and α-naphthyldimethylether.

h Thomas, M. O.
The inheritance of cracking resistance in the tomato fruit.
Diss. Abstr., 1956, **16**: 2275, being *Publ.* 18,877 of 44 pp.

i Wager, V. A.
Common diseases of vegetables in South Africa. [English and Afrikaans.]
Department of Agriculture, Pretoria, 1956, 9×6 ins., pp. 175, illus., 12s.
Symptoms and control of each disease are briefly summarized beside photographs of infected plants.

j Walker, J. C., Larson, R. H., and Pound, G. S.
Badger Ballhead, a new cabbage resistant to yellow and mosaic.
Phytopathology, 1957, **47**: 269-71, bibl. 5, illus.
A Wisconsin Ballhead × Wisconsin Hollander cross.

k Winter, E. J.
The irrigation of vegetables. A review of the present stage of our knowledge.
N.A.A.S. Quart. Rev., 1957, No. 36, pp. 63-71, bibl. 24, illus.

l Yates, R. E.
Crop-raising conditions and other problems of Cook Islands tomato growers.
N.Z. Comm. Gr, 1957, **12**(11): 8-9, 12, illus.
Production by natives under tropical conditions.

m Yen, D. E., and Cruickshank, I. A. M.
The breeding of peas resistant to *Fusarium* wilt.
N.Z. J. Sci. Tech., Sect. A, 1957, **38**: 702-5, bibl. 8.
Garden and field peas resistant to *F. orthoceras* var. *pisi.*

n Young, P. A.
Why tomato flowers fail to set fruits.
J. Rio Grande Valley hort. Soc., 1957, **11**: 103-4.
Nutrition, climatic factors, varietal differences and diseases discussed briefly.

o Zabin, I.
The formation of radioactive lycopene in ripening tomatoes.
J. biol. Chem., 1957, **226**: 851-9, bibl. 23.

p Zaumeyer, W. J., and Thomas, H. R.
A monographic study of bean diseases and methods for their control.
Tech. Bull. U.S. Dep. Agric. **868**, revised 1957, pp. 255, bibl. 1207, illus.
Phaseolus vulgaris and *P. lunatus*. For first edition see *H.A.*, 14: 1787.

TOBACCO.

Breeding and varieties.

(*See also* 3664c, m-q, 4022.)

3606. BOLSUNOV, I.
La possibilité de la fixation d'hétérosis chez les plantes autogames et son importance pour la sélection pratique. **(The possibility of fixing heterosis in self-fertilizing plants and its importance for practical selection.)**
Reprinted from *Caryologia*, 1954, **6**(Suppl.): 985-93, bibl. 20, illus. [received 1957].

Results are quoted from 22 years' work in Russia and Austria on breeding and selection of tobacco, using *Nicotiana tabacum* and *N. rustica*. Not only was the hybrid vigour appearing in F_1 of certain crosses fixable by selection, but in crosses of widely separated geographical races or of sub-species of *N. rustica* a kind of super-heterosis with yield increases occurred in F_2 and subsequent generations. In *N. tabacum* similar results were obtained for increased plant height.

3607. RAEBER, J. G.
Are there any varieties particularly suitable for late planting.
Rhod. Tobacco, 1957, No. 14, pp. 22-3.

In 2 experiments 10 varieties were planted out on Oct. 18–28, Nov. 20 and Dec. 15 at Kutsaga and on Nov. 9, Dec. 1 and Dec. 22 at Trelawney. With each variety later planting resulted in a sharp decline in quality (grade index) and in yield.

3608. RENIER, A., AND MOUNAT, A.
Étude comparative de variétés de tabac Paraguay de diverses origines. **(Comparative study of varieties of Paraguay tobacco of different origin.)**
Ann. Inst. exp. Tabac Bergerac, 1955, **2**(2): 71-84, illus.

Strains of Paraguay tobacco, developed in 4 different districts of France, were compared at Bergerac for yield, behaviour during drying, nicotine content and commercial value. The 4 types are described in detail.

Seed treatment and germination.

3609. IZARD, C.
Recherches sur la physiologie de la germination des graines immatures de *N. tabacum* L. en présence de sels d'urane. **(Studies on the physiology of germination of immature seeds of *Nicotiana tabacum* in the presence of uranium salts.)**
Ann. Inst. exp. Tabac Bergerac, 1956, **2**(3): 61-95, bibl. 17.

Under ordinary conditions of light and darkness, the low viability of freshly harvested seeds of certain hybrid tobaccos was improved markedly by treatment with uranium nitrate at 10^{-3} and significantly by the same substance at 10^{-4}–10^{-6}. Toxicity to the developing seedlings was avoided by replacing the active solutions by water after germination had begun. The stimulating effect was reduced by the addition of IAA at 10^{-4}–10^{-6}. Both percentage and speed of germination were increased markedly by continuous darkness and very strikingly by continuous light. In darkness both nitrate and acetate of uranium stimulated germination, the former the more actively, but in light the acetate had a slight stimulating and the nitrate a slight inhibiting effect. Methylene blue had an inhibiting effect in darkness but not in light. Riboflavin and IAA also had a negative effect in darkness, but tended to act positively in light.

3610. HITIER, H., AND IZARD, C.
Effets de la streptomycine, de la framycétine, des hydrazides maléique et isonicotinique sur la germination des graines de tabac. **(Effects of streptomycin, framycetin and maleic and isonicotinic hydrazides on germination of tobacco seeds.)**
Ann. Inst. exp. Tabac Bergerac, 1955, **2**(2): 55-60, bibl. 5.

At 10^{-4} framycetin and maleic hydrazide were harmless, streptomycin caused chlorosis and isonicotinic hydrazide necrosis of seedlings, but without significant reduction of germination percentage. All were harmless at or below 10^{-5}. At 10^{-2} streptomycin markedly retarded germination, maleic hydrazide was highly and isonicotinic hydrazide completely lethal. Germination was not accelerated by any of these substances.

3611. HITIER, H., AND IZARD, C.
Action combinée de la chaleur et de l'humidité sur le pouvoir germinatif des graines de *Nicotiana tabacum* L. Obtention de mutations expérimentales. **(Combined action of heat and moisture on germinating power of *Nicotiana tabacum* seeds. Production of experimental mutations.)**
Ann. Inst. exp. Tabac Bergerac, 1952, **1**(3): 87-99, bibl. 3, illus., [received 1957].

Tobacco seeds initially containing about the normal 8% of moisture and showing 97% viability had the latter reduced to 10% after storage in sealed vessels for 24 hr. at 65° C. or 30 days at 45° C. Similar seeds in open vessels maintained almost full viability for 1 month at 65° C. and 10% of them were still viable after 6 months. With initial moisture contents of over 20% the deterioration of enclosed seeds was much more rapid. Normal seeds enclosed for 12 hr. at 65° C. and moistened seeds enclosed for 15 days at 45° C. produced various mutants, amounting to about 1% of the number of seeds.

3612. RACOVITA, A.
La désinfektion thermique par voie sèche des semences de tabac. **(Heat treatment of tobacco seeds with dry air.)**
Lucr. Inst. Cercet. aliment., Bucharest, 1957, **1**: 175-88, from *Abstract Card Inst. Tabakforsch., Dresden*, No. 57/289.

Germination, growth and quality were improved by heat treatment. Following Russian experience, treatment at 85–90° C. for one hour is recommended.

3613. GUTHRIE, F. E., AND KINCAID, R. R.
The effect of methyl bromide fumigation on the germination of tobacco seed.
Tobacco, N.Y., 1957, **144**(5): 18-19, from *Abstract card Inst. Tabakforsch., Dresden*, No. 57/152.

n Florida tobacco seed is stored in the same barn as bacco. Fumigation of the tobacco for pest control oes not depress seed germination appreciably provided s moisture content at the time of treatment does not xceed 10%. A repetition of the treatment should, owever, be avoided.

Environment and nutrition.

(*See also* 3072, 3075.)

614. Chouteau, J.
Détermination de l'évapotranspiration d'un sol cultivé en tabac. Application à la conduite des arrosages. **(Determination of evapotranspiration from a tobacco soil. Its application to irrigation practice.)**
Ann. Inst. exp. Tabac Bergerac, 1956, **2**(3): 97-119, bibl. 8.

he crop drew water from a depth of at least 120 cm. method is given for determining the moisture balance f the 0–30 cm. soil layer from the date, age of crop, ainfall retention and average of moisture removed ver a 10-day period. The critical deficit is estimated entatively at 25 mm. [See also *H.A.*, 27: 2574.]

615. Zaffanella, M. J. R., and Gemesio Zaffanella, M.
Influencia de algunos factores edáficos sobre el rendimiento del tabaco. **(Effect of some soil factors on tobacco yields.)**
Idia, 1956, Nos. 106/8, pp. 284-6.

he relationship between soil profile depth and P_2O_5 ontent necessary for satisfactory tobacco crops was xpressed by a curve of hyperbolic type, examples of ritical combinations being 14 g. of P_2O_5 per cu. m. with 200 cm. depth, 26 g. with 100 cm. and 152 g. with 0 cm. Similar curves were constructed for soil K and Mg. In plotting values for prospective or existing obacco soils their suitability was immediately apparent the point lay on the correct side of the curve. Virinia Bright in soil of poor structure was improved in oth quality and yield by P fertilizers and in pot experiments the addition of Krilium to the soil markedly improved growth and advanced maturity.

616. Homès, M. V., and van Schoor, G. H.
Composition minérale du tabac en fonction du milieu nutritif. **(Mineral composition of tobacco in relation to the nutrient status of the medium.)**
Plant Analysis and Fertilizer Problems, I.R.H.O., Paris, 1957, pp. 32-53, bibl. 4.

Analyses were made on the 19th leaf from the base and on the stem section between the 17th and 20th leaves, ampled at harvest time from tobacco plants grown n solution culture. Among the anions, only N and Cl ontents of leaf and stem varied significantly with ariation in concentration of the same element in the medium. The leaf and stem contents of all the cations were greatly and directly affected by the concentration of the same element in the medium. For all the elements showing large variation in leaf content, namely N, Cl, K, Ca and Mg, the coefficients of regression for leaf values were very similar to one another. The higher coefficients of regression for leaf values, compared with those for stem values, showed that substances of mineral origin accumulated mainly in the leaves, whereas elaborated substances such as carbohydrates accumulated in the stems. Leaf and stem contents of N, S and P were little affected by variation of other elements in the medium, but Cl content was reduced in the high N and K treatments. The contents of all cations increased with high N concentrations. The total cation contents varied little with variation in the cationic ratio of the medium. The total cation : total anion ratio in the leaf was slightly more than unity except in the high N treatment. In the stem this ratio was slightly higher than in the leaf. The optimum composition of leaf and stem is tabulated.—Univ. Brussels.

3617. Renier, A.
Essais de comparaison d'engrais par la méthode statistique des blocs incomplets, au point de vue des rendements en poids. **(Comparative manurial trials by the statistical method of incomplete blocks, from the standpoint of yield in weight.)**
Ann. Inst. exp. Tabac Bergerac, 1952, **1**(3): 139-49 [received 1957].

Potassium sulphate at 300 kg. per ha. did not significantly affect yield, but highly significant increases were produced by calcium nitrate at 300 and 600 kg. per ha., with similar results from 600 and 1,200 kg. per ha. of oil cake. The trials covered 5 years.

3618. Hitier, H., and others.
La fumure azotée du tabac. Essais comparatifs de nitrate et d'ammonitrate à différentes doses. **(Nitrogen fertilizing of tobacco. Comparative trials with nitrate and ammonium nitrate at different rates.)**
Ann. Inst. exp. Tabac Bergerac, 1956, **2**(3): 17-34, bibl. 1.

Ammonium nitrate did not differ significantly from ammoniated calcium nitrate in its effect on yield or quality, but increasing the N application from 0 to 46·5, 93 and 139·5 kg./ha. gave a significant yield increase in each case. Quality was markedly improved by the single N application and reached an optimum with the double quantity. The nicotine content was increased by 25%, 40% and 50% by the respective N applications. [See also next abstract.]

3619. Chouteau, J.
Influence de la fumure azotée minérale sur quelques caractéristiques physiques et chimiques de la feuille du tabac. **(Effect of mineral nitrogen fertilizing on some physical and chemical characteristics of tobacco leaves.)**
Ann. Inst. exp. Tabac Bergerac, 1956, **2**(3): 35-60.

In the experiment referred to in the preceding abstract the highest N level produced the greatest leaf area, but except for the top leaves of the plant, this was accompanied by a decrease in thickness. Thus weight increase due to N was greatest in the upper leaves. It was greater in skeletal than in interveinal tissue. At the single and double N application levels there was a linear increase in percentage leaf N, but at the triple level the final increment was only half the previous ones and was zero where drought intervened.

3620. **Bourgin, C., and Hutter, W.**
Étude sur l'azote et le tabac. Essai de fumure azotée à la Station Expérimentale Agricole de Sidi-Slimane. **(Study on nitrogen and tobacco. An experiment on nitrogen fertilization at the Agricultural Experiment Station at Sidi-Slimane.)**
Terre maroc., 1957, **31**: 171-9.

Yields of green leaf from a burley tobacco variety were increased by N fertilization, but there was little effect on the physical characters of the leaf. Increased N fertilization resulted in higher nicotine contents and in higher contents of total volatile bases, which reduced tobacco quality. Sulphate of ammonia applied to excess was particularly detrimental to quality. For slightly alkaline, fertile soils, such as those at Slimane, it is suggested that N would best be applied in stages as follows: (1) 2 to 3 weeks before planting 50–75 kg. urea or 100–150 kg. sulphate of ammonia; (2) at both the first and second hoeings 100 kg. calcium or potassium nitrate.

Cultural practices.

(*See also* 3664b, h, i.)

3621. **Garmany, H. F. M.**
The best time for ploughing.
Rhod. Tobacco, 1957, No. 14, pp. 12-13.

The results are summarized of a number of experiments at Trelawney and Kutsaga. On light sandy soils, whether virgin, rotated or reverted, early ploughing (February–March) has resulted in substantially higher yields than later ploughing (June or September). With early ploughing the general effect of applying N at ploughing has been to increase yields slightly but to reduce quality considerably. With late ploughing the application of 36 to 48 lb. N per acre may be desirable. On slightly heavier sandy loam soils the trends have been similar, but the benefits of early ploughing and the responses to N have been less pronounced. In general deep ploughing and sub-soiling have been beneficial to both yield and quality.

3622. **Britt, C. S., and Slater, C. S.**
Ridged rows and winter cover crops in tobacco production.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 351-4, bibl. 6.

Ridged rows and winter cover crops were used to control erosion and promote good tilth in 1-year tobacco rotations. Studies conducted over a 5-year period comparing flat cultivation versus ridged rows showed that tobacco yields were increased substantially by ridging in wet years. In dry years, yields on ridged and flat plots were essentially the same. Winter cover crops and their management affected both the yield and quality of the succeeding tobacco crop. Ryegrass alone reduced yield and vetch alone lowered quality. Highest yields and quality of tobacco followed mixed cover crops of rye and vetch or ryegrass and vetch. Late turning of the mixed cover crops was better than early turning. Aside from supplying more organic residues to the soils, late turning promoted the larger yield of tobacco of as good a quality as early turning. [Authors' abstract.]

3623. **Mann, T. J., and Tisdale, S. L.**
The effect of transplanting method on variation of dry weight of individual flue-cured tobacco plants.
Tech. Bull. N.C. agric. Exp. Stat. **125**, 1956, pp. 12, bibl. 1.

In order to increase the precision and efficiency of experiments with flue-cured tobacco, a study was conducted to determine the effect of starter solutions and various methods of transplanting on the stand, average plant weight, and variability of plant weight of this crop. Results indicated that the least variability and lowest mortality of plants resulted from the use of plant bands while the highest mortality and greatest variability in leaf dry weight resulted from the usual method of transplanting. Differences in average dry weight that were apparent one month after transplanting had disappeared at harvesting. Plant-to-plant variation persisted throughout the growing period but plot-to-plot variation was negligible. The use of a starter solution resulted in decreased average plant weight and plant stands, with increased plant-to-plant variation particularly one month after transplanting by the normal method. Comparisons of plant-to-plant variations in each of the transplanting methods showed that the use of bands in transplanting increased efficiency by 3½ times as compared to transplanting without bands.

3624. **Hitier, H., and Izard, C.**
Recherches sur l'inhibition des bourgeons axillaires du tabac après écimage. **(Studies on the inhibition of suckering after topping.)**
Ann. Inst. exp. Tabac Bergerac, 1953, **1**(4): 147-63, bibl. 10, illus., [received 1957].

Treatment of topping wounds with NAA had more effect than treatment with 2,4-D but it reduced yield slightly and did not inhibit suckering effectively nor save labour. Sunflower oil as a 30% emulsion applied at 2·5 g. of oil per plant considerably checked axillary growth without damaging leaves or reducing yield, but this treatment cost rather more than normal disbudding. Mineral oil sprayed at 5 c.c. per plant checked suckering, but damaged young leaves. Maleic hydrazide at 10–20 c.c. of 0·5% solution per plant acted similarly, but was still more harmful to young leaves. [For more recent work see *H.A.*, 26: 750 and next abstract.]

3625. **Mounat, A.**
L'inhibition des bourgeons du tabac après écimage. Resultats pratiques. **(Inhibition of suckering of tobacco after topping. Practical results.)**
Ann. Inst. exp. Tabac Bergerac, 1956, **2**(3): 131-41, bibl. 1.

Nut oil rejected as unfit for human consumption applied at slightly less than 1 c.c. per plant to the cu stem after topping, gave 90–95% inhibition of sprouting. This treatment and the partial disbudding necessary with it cost slightly less than ordinary disbudding. It increased yield, but tended to reduce alkaloid content and retard maturity.

3626. **Emond, R. E., and Pattenden, W. C.**
Tobacco-desuckering compositions.
U.S. Patent **2,772,152**, from abstr. in *Chem. Abstr.*, 1957, **51**: 3910-11.

A paste applied to tobacco just below the exposed surface of the freshly "topped" plant is 86–89% successful in the control of suckers and increases the yield of the 2 top leaves by 20%. It is prepared from 5–15 g. stearic acid, 1·5–5·0 g. NaOH (50° Bé.) and 90 g. white oil (150–350 Saybolt Universal sec. viscosity) by heating at 100° F. to drive off water.—Esso Res. and Engng Co.

3627. LACOTTE, J.
Un exemple d'étude du travail: la cueillette du tabac au Maroc. **(An example of a work study: tobacco harvesting in Morocco.)**
Étude du Travail, 1956, No. 70, pp. 9-16, from *CORESTA Inf. Bull.*, 1957, Abstr, 473.

A work study at the Experimental Station of El Mouzine, Morocco, covered methods of priming, collecting, transport and stringing of burley and Virginia tobaccos. Saving in time ranging from 25 to 50% resulted from providing primers with double baskets attached to their belts, from putting bundles of leaves into canvas containers for transport to the curing barn, and from the use of stringing machines.

Physiology and biochemistry.

(*See also* 3041, 3664e-g, j, k, t.)

3628. TSO, T. C., AND JEFFREY, R. N.
Studies on tobacco alkaloids. II. The formation of nicotine and nornicotine in tobacco supplied with N^{15}.
Plant Physiol., 1957, **32**: 86-92, bibl. 13.

A study of the formation of nicotine and nornicotine has been conducted employing tongued inarch grafting, detached leaf culture, and isotopic nitrogen (N^{15}) as nitrate in nutrient solution culture. *Lycopersicum esculentum* Mill. var. Rutgers and *Nicotiana tabacum* L. var. Robinson Medium Broadleaf, a tobacco variety known to contain relatively large proportions of nornicotine, were used. Nicotine synthesis in plants composed of tobacco scions on tomato stock was observed in far larger quantities than would be expected on the basis of previous studies. Grafted plants were transferred to a nutrient solution containing 20% excess N^{15} as nitrate. After four weeks' growth in this solution the alkaloids isolated from these plants contained about 6% excess N^{15}. In plants composed of tomato scions on tobacco stocks, grown in N^{15} nutrient solution after grafting, the nornicotine isolated from the roots contained a higher N^{15} excess than did the nicotine, indicating root synthesis of nornicotine independent of nicotine. The leaf nornicotine also contained a greater excess of N^{15} than did leaf nicotine, indicating translocation of nornicotine to the leaf. The results here presented may be explained by an hypothesis that alkaloid synthesis is a stepwise process and the distinctive property of the root in this process is the synthesis of some alkaloid precursor(s). [Authors' summary.]—Univ. Md, College Park, and U.S.D.A. agric Res. Serv., Beltsville,, Md. [For part I see *H.A.*, 27: 2572.]

3629. BOTHNER-BY, A. A., DAWSON, R. F., AND CHRISTMAN, D. R.
Is lysine the source of the pyridine ring in nicotine?
Experientia, 1956, **12**(4): 151-2, from *CORESTA Inf. Bull.*, 1957, Abstr. 378.

Experiments made with lysine labelled with radioactive carbon or nitrogen show that this amino does not participate directly in nicotine synthesis.

3630. BOSE, B. C., AND OTHERS.
Studies on the biogenesis of nicotine alkaloids in tobacco plants. I. Effect of inorganic nitrogenous compounds and of different amino-acids in the *in vitro* synthesis of nicotine by leaves, stems and roots of *Nicotiana tabacum.*
Indian J. med. Res., 1956, **44**(1): 81-9, from *CORESTA Inf. Bull.*, 1957, Abstr. 89.

Tobacco leaves, stems and roots can synthesize nicotine in media containing ammonium sulphate or potassium nitrate, or, in the case of leaves, in the presence of arginine, ornithine, proline, tryptophane and anthranilic acid.

3631. BOSE, B. C., DE, H. N., AND MOHAMMAD, S.
Studies on the biogenesis of nicotine alkaloids in tobacco plants. II. Investigation on trans-methylation of nicotine and nor-nicotine in *N. tabacum* and *N. glauca.*
Indian J. med. Res., 1956, **44**(1): 91-7, from *CORESTA Inf. Bull.*, 1957, Abstr. 90.

Using a micro-method of determination based on a colour reaction to quinhydrone, it has been shown that both *N. tabacum* and *N. glauca* possess an enzyme system that is able to transform nicotine into nornicotine.

3632. IL'IN, G. S.
The role of the tobacco root in nicotine synthesis. [Russian.]
Fiziol. Rast. S.S.S.R., 1955, **2**(6): 573-7, from *CORESTA Inf. Bull.*, 1957, Abstr. 84.

Using C^{14} it has been demonstrated that CO_2 absorbed by tobacco roots and stems participates in nicotine synthesis in the roots.

3633. MOTHES, K.
Neue Untersuchungen über die Biosynthese der Alkaloide. **(Recent studies on the biosynthesis of alkaloids.)**
Ber. Dtsch. bot. Ges., 1954 (issued 1955), **67** (Special No.): 15-17, from *CORESTA Inf. Bull.*, 1957, Abstr. 71.

Most of the nicotine in tobacco and the hyoscyamine in belladonna is found in the roots, although small amounts are also formed in the youngest parts of the shoots. However, the almost complete suppression of nutrient uptake by the roots and its replacement by foliar nutrition with ammonium nitrate did not result in a reduction in the biosynthesis of these alkaloids.

3634. MASHKOVCEV, M. F., AND SIROTENKO, A. A.
Nicotine destruction by tobacco roots during a period of water stress. [Russian.]
Fiziol. Rast. S.S.S.R., 1956, **3**(1): 79-86, and Suppl. pp. 7-8, from *CORESTA* Inf. Bull., 1957, Abstr. 91.

When tobacco roots were dipped in a solution containing nicotine in the form of a neutral salt it was rapidly absorbed. Inside the tissues it was degraded, 80% being recovered as ammonia and the rest being found partly in the protein fraction and partly as water soluble N.

3635. Renier, A.
Teneur en nicotine, durée d'insolation et intensité de radiations. **(Nicotine content, duration of insolation and light intensity.)**
Ann. Inst. exp. Tabac Bergerac, 1952, **1**(3): 71-6 [received 1957].

The correlation between the nicotine content of tobacco and hours of sunlight between June 1 and August 31 was not significantly affected whether the light intensity was allowed to vary or was kept constant. A positive correlation between nicotine content and light intensity, which was found when duration varied, disappeared when duration was constant.

3636. Dawson, R. F., and Solt, M. L.
Production, translocation and destruction of nicotine in the grafted tobacco shoot.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xxxvi.

Extensive experiments have been carried out with single and double-grafted shoots and topped scions of *Nicotiana tabacum* vars. Turkish and Connecticut Shade and with *N. rustica* var. *brasilia.* Nicotine is synthesized in growing leaves and shoot tips, and also in older portions of the stalk, generally in proportion to the amount of cambial activity. The amount of nicotine synthesized in the stalks is dependent on the presence of translocatable nutrients and obstructions to translocation may greatly increase nicotine production. Nicotine may be translocated from stalk to leaf. In older leaves and in *N. rustica* nicotine may virtually disappear at the time of fruiting.—Columbia Univ., New York.

3637. Fardy, A., Cuzin, J., and Schwartz, D.
Greffes de demi-embryons de *Nicotiana* sur plantules et sujets adultes. **(Grafts of half embryos of *Nicotiana* on seedlings and adult plants.)**
Ann. Inst. exp. Tabac Bergerac, 1952, **1**(3): 133-7, bibl. 1, illus. [received 1957].

Cotyledonary halves of *N. tabacum* and *N. rustica* embryos grew successfully on species of *Nicotiana*, *Petunia* and *Datura.* Radicular halves were grafted only on the 2 *Nicotiana* spp., on which they grew for a short time, underwent some weeks of suspended activity and afterwards produced a leaf bud.

3638. Vickery, H. B., and Palmer, J. K.
The metabolism of the organic acids of tobacco leaves. XII. Effect of culture of excised leaves in solutions of malonate at pH4 to pH7.
J. biol. Chem., 1957, **225**: 629-40, bibl. 29.

Malonic acid was taken up freely by excised leaves of the tobacco variety Connecticut shade-green, when these were cultured in solutions of potassium malonate adjusted to pH values of 4, 5, 6, and 7. The outstanding effect in all the samples cultured in malonate was a prompt and extensive accumulation of succinic acid, which supports the view that a succinic dehydrogenase system plays an important metabolic role in tobacco leaves. No evidence was obtained that malonic acid inhibited respiration or that it affected malic acid utilization, but it may have interfered to some extent with reactions of which citric acid is the product.—Conn. agric. Exp. Stat., New Haven. [For part XI see *H.A.*, 27: 599.]

3639. Haber, A. H.
I: On the estimation of nucleic acids in tobacco pith.
II: Studies on polarity in tobacco pith.
Diss. Abstr., 1956, **16**: 2291-2, being *Publ.* 19,092 of 125 pp.

The effect of IAA and kinetin on tobacco pith tissue cultivated *in vitro* was observed. When IAA and kinetin were both present in a medium, there was a marked increase in deoxypentose nucleic acid content. The polar movement of auxin through pith ribbons containing no vascular tissue was demonstrated.—Univ. Wisconsin.

3640. Pearse, H. L., and Swain, T.
South African tobaccos. II. Identification of some phenolic constituents.
S. Afr. J. Sci., 1957, **53**: 281-5, bibl. 9.

From the examination of a sample of high-grade flue-cured tobacco of the Yellow Mammoth variety by paper chromatographic methods it has been determined that the phenolics present in greatest quantities are rutin, chlorogenic acid, scopoletin and scopolin. Only small quantities of caffeic acid are present in the free state. [Authors' abstract.]—Centr. Tob. Res. Stat., Rustenburg, Transvaal.

3641. Dorner, R. W., Kahn, A., and Wildman, S. G.
The soluble protein composition of expanding and ageing tobacco leaves.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xii.

Tobacco leaves which have recently attained full expansion contain about half of their total protein N in the form of soluble, cytoplasmic proteins. During expansion the cytoplasmic proteins follow an exponential course of synthesis, with a decline starting once rapid expansion is over.—Univ. Calif., Los Angeles.

3642. Costes, C., and Coic, Y.
Variations des pigments foliaires en fonction de la carence en azote et du vieillissement chez le tabac. **(Variations of leaf pigments in relation to nitrogen deficiency and to ageing in tobacco.)**
C.R. Acad. Sci. Paris, 1957, **244**: 1398-1401, from *CORESTA Inf. Bull.*, 1957, Abstr. 395.

In a normal chlorophyll-containing plant the ageing process seems to be characterized by the progressive disappearance of the main photoreceptor (chlorophyll *a*) whereas the intermediate photoreceptor system (carotene and chlorophyll *b*) alters very little, at least for some time. By contrast, a serious N deficiency in tobacco caused a marked reduction of the intermediate photoreceptors, especially the carotinoids, and had relatively less effect on the main photoreceptor. Moreover, in N-deficient plants there was, associated with a marked decline in photosynthetic activity and in the products thereof, a striking reduction in the content of substances, notably carotene, which are concerned with the transport of the oxygen derived from photosynthesis.

543. Izard, C., and Hitier, H.
Action de certains antibiotiques et hydrazides sur les divisions cellulaires et le chondriome d'*Allium cepa* L.—Action sur les chloroplastes de *N. tabacum*. **(Action of certain antibiotics and hydrazides on cell division and the chondriome of *Allium cepa*.—Action on chloroplasts of *Nicotiana tabacum*.)**
Ann. Inst. exp. Tabac Bergerac, 1955, **2**(2): 15-37, bibl. 15, illus.

ihydrostreptomycin caused chromosome anomalies onion roots, but not of such importance as those aused by mustard oil vapour or allyl isosulphoyanate. Young tobacco plants sprayed with dihydroreptomycin showed no hereditary changes. Frayycetin had even less effect and the hydrazides of aleic and isonicotinic acid were not mutagenic. treptomycin induced temporary and maleic hydrazide ermanent chlorosis of tobacco leaves.

Diseases and pests.

(*See also* 3338d, 3492, 3493, 3664s, x, 3999.)

544. Troutman, J. L.
Resistance in tobacco to cucumber mosaic and other viruses.
Diss. Abstr., 1957, **17**: 944-5, being *Publ.* 20,650 of 76 pp.

esistance, in so far as it reflects a tendency to escape fection, was studied in tobacco. Resistance was not esult of the slowing down of virus multiplication or of the presence of an inhibitor. Resistant plants hich were darkened for 24 hours before inoculation ecame much more susceptible. In the field resistant rieties became infected more slowly than susceptible rieties, but the final degree of infection was not ways lower.—Univ. Wisconsin.

545. Pirie, N. W. (and Bawden, F. C.).
Factors affecting the infectivity of plant viruses.
A.R. Rothamsted exp. Stat. 1956, 1957, p. 94.

itochondria from tobacco leaves infected with tobacco ecrosis virus can inactivate the purified virus *in vitro*. hey fail to do so in the absence of air and in the esence of cell sap, or if they have been heated, ozen or chloroformed. Mitochondria from unfected leaves have a much lower power of inactivaon. Those from ringspot infected leaves inactivated oth ringspot and necrosis viruses, but neither of em would inactivate tobacco mosaic virus (TMV). fectivity of TMV fragments containing predominantly icleic acid was destroyed by exposure to leaf ribouclease.

546. Bawden, F. C., and Kleczkowski, A.
An electrophoretic study of sap from uninfected and virus-infected tobacco plants.
Virology, 1957, **4**: 26-40, bibl. 13, illus.

he number and concentration of electrophoretically stinguishable components in sap from uninfected bacco leaves varied with the position of the leaf on e stem, the age of the plants, their nutrition and nditions of growth. Infection with tobacco mosaic rus or potato virus X, but not with tobacco etch or potato Y virus, introduced new components into the electrophoretic pattern. The concentration of normal proteins was not correlated with severity of leaf symptoms, and was not consistently affected by virus infection. [From authors' summary.]—Rothamsted exp. Stat.

3647. Pavillard, J., and Beauchamp, C.
La constitution auxinique de tabacs sains ou atteints de maladies à virus: présence et rôle de la scopolétine. **(The auxin constitution of sound and virus-infected tobacco plants: the presence and rôle of scopoletin.)**
C.R. Acad. Sci. Paris, 1957, **244**: 1240-3, from *CORESTA Inf. Bull.*, 1957, Abstr. 404.

Chromatographic studies have shown that scopoletin is a normal constituent of tobacco. In plants affected by viruses or albinism the scopoletin content increases greatly while that of indoleacetic acid decreases.

3648. Owen, P. C.
The effect of infection with tobacco etch virus on the rates of respiration and photosynthesis of tobacco leaves.
Ann. appl. Biol., 1957, **45**: 327-31, bibl. 4.
Effects of infection on respiration and photosynthesis of tobacco leaves.
A.R. Rothamsted exp. Stat. 1956, 1957, pp. 82-3.

Unlike tobacco mosaic virus, which increases the respiration of tobacco leaves within an hour of their being inoculated, a virulent strain of tobacco etch virus did not change respiration rates until leaves showed external symptoms. The respiration rates of inoculated or systemically infected leaves with symptoms rose to 40% above that of healthy leaves, three times the increase produced by tobacco mosaic virus. The increased respiration rate occurred at all times of the year and was maintained through the life of the leaves. Leaves infected with tobacco etch virus and showing symptoms had a photosynthetic rate 20% lower than that of healthy leaves. [Author's abstract.]—Rothamsted exp. Stat.

3649. Bradley, R. H. E., and Ganong, R. Y.
Potato virus Y inactivated in tobacco inoculated by aphids.
Virology, 1957, **4**: 172-81, bibl. 16.

We tried to inactivate virus Y after aphids inoculated it into susceptible [tobacco] plants, and thereby stop plants from becoming systemically infected. Ultraviolet irradiation of plants soon after inoculation stopped the infection, but spraying them with 0·5% formaldehyde did not. Ultraviolet irradiation of plants before inoculation did reduce their susceptibility to virus Y, but placing plants in more than 50% CO_2 did not. In tests with 8 "inhibitors" of infectivity, the diluted inhibitor was first sprayed on young tobacco plants and then rubbed on each plant, where it was probed once by an infective aphid. Six of the substances had little or no effect on the numbers of plants that became systematically infected; but no plants became systemically infected when treated with 2-thiouracil at 500 p.p.m. or with trichothecin at 10 p.p.m. At these concentrations, however, both substances damaged tobacco plants. Further tests showed that trichothecin, but not thiouracil, stopped most infections at concentrations that did not visibly damage plants. Trichothecin reduced infection by more than 50% when sprayed on plants 2 days before or 4 hours after they were inoculated by infective aphids. [From authors' summary.]—Ent. Lab., Fredericton, N. Brunswick.

3650. BARTELS, W.
Untersuchungen über die Beeinflussung der Aktivität des Tabakmosaikvirus durch verrottende Pflanzensubstanzen. **(Studies on the effect of rotting plant materials on the activity of tobacco mosaic virus.)** [English and Russian summaries ¼ p. each.]
NachrBl. dtsch. PflSchDienst, Berlin, 1957, **11**: 61-6, bibl. 11.

Leaves and fruits from TMV-infected plants were rotted for 12, 18 or 21 months and the subsequent activity of TMV samples was tested. In only 30 out of 780 pots were lesions produced on test tobacco plants.—Inst. Phytopath. PflSchutz, Univ. Rostock.

3651. ANGELL, H. R.
The relation of districts and of blue mould in seed beds to loss of tobacco in fields in North Queensland.
J. Aust. Inst. agric. Sci., 1957, **23**: 144-8.

A survey was made in 1956 of the incidence of blue mould in seedbeds and fields of tobacco-growing areas in North Queensland. The fungus (*Peronospora tabacina*) overwintered on *Nicotiana glauca* and *N. tabacum* in some districts but only on the latter in others. Seedbed management for control of the disease was unsatisfactory on many farms. Owing to the careless use of benzol seedbeds on a third of the farms in all districts were infected with blue mould. After transplanting the disease spread to nearly all fields. On 49 farms in one area where healthy seedlings were used for planting out the average loss was 7%, but on 43 farms where diseased seedlings were used it was 25%. In some districts blue mould rarely causes much loss in fields planted with healthy seedlings, but in others severe losses may occur even when healthy seedlings are planted.—Div. Plant Ind., C.S.I.R.O., Canberra. J.R.L.

3652. RICH, S., AND TAYLOR, G. S.
Cottonseed oil formulations of organic fungicides for tobacco.
Plant. Dis. Reptr., 1957, **41**: 456-7, bibl. 2.

Trials are described in which mixtures of cottonseed oil with suspensions of 6 organic fungicides were applied by mist blower to shade-grown tobacco. The oil left very little visible residue, and no visible leaf damage occurred when it was used with maneb, zineb, dichlone or streptomycin. With Thioneb there was moderate leaf damage and with thiram severe damage. After the leaves were processed only those treated with zineb-oil showed any residue, but burning quality was adversely affected by thiram, Thioneb and streptomycin. The incidence of blue mould (*Peronospora tabacina*) was too slight to test the protection afforded by the sprays, but the data suggest that the addition of cottonseed oil did not affect the efficiency of zineb, dichlone and thiram but may have reduced that of the other fungicides.—Conn. agric. Exp. Stat., New Haven.

3653. NUSBAUM, C. J.
Variable effects of nematocides on parasitic nematode populations in row fumigated tobacco plots.
Proc. 52nd annu. Conv. south. agric. Wkrs, 1955, p. 144, from *Abstract Card Inst. Tabakforsch., Dresden* No. 57/213.

Dowfume W-85, D-D and PN-20 were tested for nematode control. On coarse, sandy soils DD gave the best results especially against *Pratylenchus* species. The other fumigants were more effective against *Tylenchus* species. Fairly good control of *Helicotylenchus* spp. and *Xiphinema americanum* was also obtained.

3654. MICHEL, E.
Emploi des insecticides de synthèse contre le ver jaune et le ver gris. Résultats des essais de 1951–1952. **(Use of synthetic insecticides against wireworm and cutworm. Results of trials in 1951-1952.)** Essais d'insecticides en 1953. **(Insecticide trials in 1953.)** Essais d'insecticides réalisés en 1954. **(Insecticide trials carried out in 1954.)**
Ann. Inst. exp. Tabac Bergerac, 1953, **1**(4): 129-46; 1954, **2**(1): 89-102; 1955, **2**(2): 107-21 [received 1957].

Tobacco seedlings at the 5-leaf stage were damaged by field application of chlordane, toxaphene and γ-BHC at recommended rates. For wireworm control, both parathion and technical BHC were more effective when applied at planting to the roots and stems of seedlings or round the planting holes, than when applied uniformly to the soil before planting, but chlordane was considerably less effective when applied to the seedlings. Damage to seedlings was caused by BHC except when used as a pre-planting soil treatment. Seedling treatment with parathion or γ-BHC gave very good control, needing only 35 and 27 g. respectively of active material per ha. compared with 5 kg. for soil treatment with technical BHC. Soil treatment with aldrin at 4 kg. per ha. was as effective against wireworm as technical BHC at 5 kg. per ha. of active material. In pre-planting seedling treatment lindane was slightly superior to aldrin or parathion and much more effective than dieldrin. In each case seedling treatment gave better control than general soil treatment, but the plants needed careful handling. Recommended quantities per ha. are 20–30 g. of lindane, 40 g. of parathion or 200 g. of aldrin. Preliminary tests with seed-bed sprays of oleo-parathion before transplanting gave promising results. Of many treatments tested for cutworm control, none gave very good results, the best being from soil dusting round newly transplanted seedlings with DDT or aldrin. Dieldrin was less effective and both toxaphene and chlordane tended to injure the seedlings.

3655. GUTHRIE, F. E., AND RABB, R. L.
Broadcast treatments give better wireworm control.
Res. and Fmg N.C., 1957, **15**(4): 12-13, illus.

Wireworms (chiefly *Conoderus vespertinus*) were effectively controlled by adding an insecticide to the transplanting water where hand transplanters were used, but the mechanical planters results were not satisfactory. Promising results have been obtained with a pre-planting row treatment with a granulated insecticide. Broadcast treatments with aldrin, heptachlor or dieldrin have given excellent control in 2 seasons.

3656. Rosillo, M. A.
Control químico del gusano minador del tallo del tabaco. Ecología del gusano minador del tallo del tabaco. **(Chemical control and ecology of the tobacco stem miner.)**
Idia, 1956, Nos. 106/8, pp. 280-1.

In experiments comparing various insecticides against *Faustinus cubae*, the best results were given by 50%-active DDT at 0·2% and by aldrin or dieldrin at the same concentration. No damage to seedlings was observed.

3657. Siddiqi, A. A.
Residual toxicity of certain insecticides in the control of the tobacco budworm, *Heliothis virescens* (F.).
Indian J. Ent., 1955, **17**(2): 241-4, from *CORESTA Inf. Bull.*, 1957, Abstr. 230.

In field trials DDT, toxaphene and endrin applied to tobacco plants showed similar activity against *Heliothis virescens*, but after 48 hours all three showed rapid loss of residual toxicity.

3658. Patel, H. K., Patel, R. M., and Patel, R. C.
Some observations on phytotoxicity of various insecticides to tobacco.
Indian Tobacco, 1956, **6**: 175-80, bibl. 7.

Six insecticides were applied twice as sprays to young tobacco seedlings. All showed some evidence of toxicity, but the injury caused by dieldrin was very slight and that caused by aldrin, DDT, Folidol [parathion] and toxaphene was not serious. Only BHC damaged a high percentage of plants. In a further trial with BHC, applied both as dusts and sprays, toxicity increased with increase in concentration, but even the lowest concentration used (0·01%) damaged some of the plants.—Inst. Agric., Anand, Bombay State.

Curing and quality tests.

(*See also* 3664a, r, v, w.)

659. Johnson, W. H., and others.
Barnless curing.
Res. and Fmg N.C., 1957, **15**(4): 8-9, illus.

Bulk curing of whole and shredded tobacco leaves was successfully carried out in chambers holding about 00 lb. tobacco. Heat built up in the piles during ellowing by normal respiration processes, but a fan was used to keep the temperature below 100° F. Subsequently the tobacco was dried for 15 hours at 30° F. and then at 170° F. At present bulk-cured obacco is less acceptable to the market than tobacco ured conventionally.

660. Askew, H. O.
Biochemical changes during partial curing of tobacco leaves following removal of midribs.
N.Z. J. Sci. Tech., Sect. A., 1957, **38**: 715-19, bibl. 1.

The data presented in this paper demonstrate quite clearly that removal of the midribs from tobacco leaves does not interfere with the respiratory processes in the lamina which lead to the evolution of CO_2, hydrolysis of protein, and production of sugars. It cannot be conceded, therefore, that removal of the midrib would prevent the curing of tobacco leaves under commercial conditions, unless the presence of the midrib is essential for changes that occur after the end of the coloring period; but attention would need to be given to maintaining a sufficiently high humidity in the air of the kilns to prevent too rapid drying.—Cawthron Inst., Nelson. J.R.L.

3661. Cuzin, J., and Schwartz, D.
La moisissure du tabac au séchoir. **(Mould development in tobacco during curing.)**
Ann. Inst. exp. Tabac Bergerac, 1954, **2**(1): 37-44 [received 1957].

Infection was shown to be very slight during the first 3 days of curing but thereafter to increase to at least the 27th day. The critical phase was during the change of leaf colour from yellow to brown. Thus the best time for applying preventive treatment is in the earliest stages of drying.

3662. Venkataraman, K. V., and Tejwani, K. G.
Laboratory technique for leaf burn tests of flue-cured Virginia tobacco.
Indian Tobacco, 1957, **7**: 22, bibl. 2.

Leaf strips, representing different portions of leaves varying considerably in moisture content, attained a uniform moisture content of 10·5–10·7% when kept for 72 hours in a desiccator over a saturated solution of magnesium nitrate. The size of sample needed to limit the experimental error to 5% was 8·7 leaves.—Centr. Tob. Res. Inst., Rajahmundry.

3663. Sastry, A. S., and Kurup, C. K. R.
Chemical evaluation of burning quality in cheroot tobacco.
From abstr. in *Indian Tobacco*, 1956, **6**: 184.

A highly significant correlation was found to exist between cheroot burning quality, as represented by (1) the colour and character of the ash, (2) the nature and rate of burn, and (3) smoking quality, and the ratio $\frac{K_2O+CaO}{MgO+N+Cl}$. Calcium and magnesium, however, have little direct effect on the nature and rate of burn. Hence, a highly significant correlation was found to exist between this single character and the ratio $\frac{K_2O}{N+Cl}$.

Noted.

3664.
- a Bates, T. E.
  Suggestions on curing.
  Rhod. Tobacco, 1957, No. 14, pp. 10-11, bibl. 4.
  Flue-curing.
- b Bhat, N. R.
  Indian flue-cured Virginia tobacco.
  Indian Tobacco, 1957, 7: 15-17.
  Measures and research needed to improve yield and quality.

c Bolsunov, I.
Zum Problem der Wahl einer für den österreichischen Tabakanbau geeigneten Burley-Sorte. (**The choice of a Burley tobacco variety suited to Austrian conditions.**)
Tabakpfl. Österr., 1956, **7**(4): 1-7, illus.
On the aims of the author's breeding work at Fürstenfeld.

d Casas Lajonchere, F. R.
Tabaco; es una planta oleaginosa? (**Is tobacco an oil plant?**)
Rev. Agric. Habana, 1956, **39**(3): 88-98, bibl. 24.
Composition, properties and uses of tobacco seed oil.

e Cuzin, J., and Jaeger, M.
Préparation d'un échantillon de dipicrate de nor-nicotine. (**Preparation of a sample of nornicotine dipricate.**) [French and English.]
CORESTA Inf. Bull., 1957, No. 2, pp. 12-22, bibl. 2.
Extracted from *N. glutinosa.*

f Cuzin, J., and Schwartz, D.
Microdosage photo-colorimétrique des bases nicotiniques dans le tabac en vert. (**Micro-determination of nicotine bases in green tobacco by photo-colorimetry.**)
Ann. Inst. exp. Tabac Bergerac, 1952, **1**(3): 61-9, bibl. 3 [received 1957].

g Das, N. K.
Initiation of DNA synthesis, mitosis, and cell division by kinetine and indoleacetic acid in excised tobacco pith tissue.
Diss. Abstr., 1957, **17**: 955-6, being *Publ.* 20,623 of 77 pp.

h Davis, O.
Bulking method.
Rhod. Tobacco, 1957, No. 14, pp. 16-17, illus.
A grower describes his bulking frame.

i Espinet, G. R.
Análisis económico del cultivo del tabaco en Puerto Rico. (**Economic analysis of tobacco growing in Puerto Rico.**) [English summary 1¾ pp.]
Bol. Estac. exp. agric. Río Piedras, P.R. **133**, 1956, pp. 40, illus.

j Fardy, A., Cuzin, J., and Schwartz, D.
Ontogénèse de *Nicotiana tabacum* L. Structures et fonctions du méristème apical. (**Ontogeny of *Nicotiana tabacum*. Structures and functions of the apical meristem.**)
Ann. Inst. exp. Tabac Bergerac, 1953, **1**(4): 73-100, bibl. 56, illus. [received 1957].

k Geissman, T. A., and Swain, T.
Biosynthesis of flavonoid compounds in higher plants.
Chem. Ind. Lond., 1957, No. 28, p. 984, bibl. 7.
Including the biosynthesis of caffeic acid in tobacco.

l Gupta, P. S., and Shukla, T. N.
Cultivation of hookah tobacco (*Nicotiana rustica* L.) in Kampil area of U.P.
Indian Tobacco, 1957, **7**: 19-21, bibl. 1.
Varieties, cultural practices, costs and returns.

m Hitier, H., and Izard, C.
Contribution à l'étude de l'action mutagène de l'essence de moutarde. Essais sur *N. tabacum* L. et *Allium cepa* L. (**Contribution to the study of mutagenic action of mustard essence. Experiments with *Nicotiana tabacum* and *Allium cepa*.**)
Ann. Inst. exp. Tabac Bergerac, 1952, 1(3): 101-16, bibl. 2, illus. [received 1957].
Mutants produced with vapour from mustard oil described.

n Izard, C.
Obtention et fixation de lignées tumorales et non tumorales à partir de mutations expérimentales de l'hybride *N. glauca* × *N. langsdorffii.* (**Production and fixation of tumour-bearing and tumour-free strains from experimental mutations of the hybrid *Nicotiana glauca* × *N. langsdorffii.***)
C.R. Acad. Agric. Fr., 1957, **43**: 325-7, bibl. 5.

o Izard, C., and Hitier, H.
Observations sur un hybride complexe, susceptible de produire des plantes à stérilité male. (**Observations on a complex hybrid liable to produce male-sterile plants.**)
Ann. Inst. exp. Tabac Bergerac, 1955, **2**(2): 93-105, bibl. 10, illus.
In a hybrid of *N. suaveolens* × *N. tabacum* var. *chinensis.*

p Izard, C., and Hitier, H.
Obtention d'un amphidiploide naturel: *N. tabacum* L. (var. Corolle double x) × *N. sylvestris* Speg. et Comes. (**Production of a natural amphidiploid: *Nicotiana tabacum* (var. Double Corolla x) × *N. sylvestris*.**)
Ann. Inst. exp. Tabac Bergerac, 1956, **2**(3): 143-7, bibl. 9, illus.

q Krishnamoorthy, K. V., and Bhat, N. R.
An amphidiploid *Nicotiana glutinosa* L. × *Nicotiana trigonophylla* Dun. hybrid.
Curr. Sci., 1957, **26**: 120, bibl. 2, illus.
A vigorous, fertile hybrid under study for disease resistance, etc.

r Maunsell, G. M. B.
A simple method of grading.
Rhod. Tobacco, 1957, No. 14, pp. 20-1, illus.
Based on use of a canvas conveyor belt.

s Mehta, S.
Control of diseases in tobacco crop.
Indian Tobacco, 1957, **7**: 25-6.
General recommendations for seed beds and field.

t PANOUSE, J. J.
Combinaisons glucosidiques de la nicotine. **(Compounds of nicotine with glucosides.)**
Ann. Inst. exp. Tabac Bergerac, 1953, **1**(4): 9-46, bibl. 126 [received Aug. 1957].
A study and review of the function of nicotine in the physiology of tobacco.

u PÉREZ, J. E., ADSUAR, J., AND PADILLA, E. A.
A survey for common tobacco- and pepper-mosaic viruses in the filler-tobacco area of Puerto Rico.
J. Agric. Univ. P.R., 1957, **41**: 20-4, bibl. 6.
TMV found in 75·4% of samples tested and PMV (mottle) in 17%.

v TISNÈS, P. J., AND CHAPUT, A.
Étude chromatographique des variations des acides aminés libres du tabac au cours de la fermentation accélérée et naturelle. **(Chromatographic study of changes in free amino acids in tobacco during natural and rapid fermentation.)**
Ann. Inst. exp. Tabac Bergerac, 1955, **2**(2): 61-70, bibl. 5, illus.
Of 13 amino acids in dried tobacco 11 were present after rapid, and only 6 after natural, fermentation.

w TISNÈS, P. J., PENVEN, R., AND GUILLEAU, L.
Étude systématique des transformations biochimiques subies par le tabac durant les fermentations artificielle et naturelle. **(Systematic study of biochemical transformations occurring in tobacco during artificial and natural fermentation.)**
Ann. Inst. exp. Tabac Bergerac, 1956, **2**(3): 149-64.
Marked differences in pH, etc., between natural and artificial methods.

x TODD, F. A.
Brown spot of tobacco.
Ext. Circ. N.C. agric. Ext. Serv. **139**, 1957, 1 folded sheet, illus.
Symptoms, control and tolerant varieties.

MISCELLANEOUS TEMPERATE AND TROPICAL PLANTS.

Condiment and spice plants.

(*See also* 3403-3405, 4021.)

65. FERRARA, A.
Tecnologia delle spezie: pepe, pimento, capsico. **(Technology of spices: pepper, pimento, capsicum.)**
Riv. Agric. subtrop., 1957, **51**: 181-206, illus.

This review covers the following subjects: *Pepper:* Harvesting, preparation of black and white pepper, grading and packing, composition of black and white pepper, production and trade figures. Composition of *Piper officinarum* and *P. famechoni*. Brief notes on *P. longum*, *P. guineense*, *P. clusii* and false peppers of other genera. *Pimento* (*Pimenta officinalis*). Harvesting, drying, composition, annual production in Jamaica. *Capsicum:* Composition, harvesting, drying, dyes as by-products, medicinal uses. Common adulterants are mentioned for each space. [For part I, on cloves, see *H.A.*, 27: 2847.]

666. SZŐKE, S.
A cikóriagyökér szárazanyag- és inulintartalma. **(The dry matter and inulin content of chicory roots.)**
Söripar, 1956, No. 5, pp. 111-14, from abstr. in *Hung. agric. Rev.*, 1957, **6**(2): 5.

A decline in the roasting quality of chicory roots has been tentatively traced to the use of the long Magdeburg variety, in which the lower, tapering part of the root, which contains most of the inulin, is frequently broken off during harvesting. The dry matter, which occurs in fairly large quantities in the upper part of the root, is mainly cellulose.

667. PATEL, P. N., AND OTHERS.
Fusarium wilt of cumin.
Curr. Sci., 1957, **26**: 181-2, bibl. 1.

Fusarium oxysporum f. *cumini* is described. The disease is specific to *Cuminum cyminum* and attacks the vascular tissues causing the plant to wilt. In a preliminary survey, losses in two areas were found to vary between 5 and 60%.—Inst. Agric., Anand and Dep. Agric., Rajasthan.

3668. SUNDARARAJ, J. S., AND VARADARAJAN, E. N.
Propagation of nutmeg on different rootstocks.
South Indian Hort., 1956, **4**: 85-6.

Female nutmeg trees (*Myristica fragrans*) were propagated on seedling rootstocks by inarching at the Burliar Fruit Station on the Nilgiris. The percentage take ranged from 40 to 80 depending on the season. Successful grafts were also made on the wild species *M. malabarica* and *M. beddomei*.

3669. SEMEL, M.
Control of the carrot weevil attacking parsley.
J. econ. Ent., 1957, **50**: 183-4, bibl. 6.

Emulsion sprays and broadcast treatments with granulated formulations of dieldrin and heptachlor, at practical levels, gave very good control of carrot weevil, *Listronotus oregonensis*, in parsley, when the application was made to newly emerged plants and repeated after each cutting. Treatments appeared to be effective for a minimum of 22 to 33 days. Pre-emergence treatments with these insecticides in granulated form also showed good promise.—Long Island Veg. Res. Fm, Riverhead, N.Y.

3670. NORMAND, A. G.
South Pacific Commission. Pepper introduction in Tahiti.
Tech. Inf. Circ. S. Pacific Commiss. **22**, 1957, pp. 16.

The prospects for commercial cultivation of black pepper in the islands of French Oceania are discussed. In small scale trials with introduced material propagation by both seed and cuttings has been successful. Plans for development are outlined.

3671. Vanderweyen, A.
Une maladie foliaire du poivrier cultivé. **(A leaf disease of cultivated pepper.)** [Flemish summary 1 p.]
Bull. agric. Congo belge, 1957, **48**: 365-70, illus.

A severe disease of pepper leaves caused by *Rhizoctonia solani* was not completely controlled by copper fungicides or captan. Disinfection of compost with a 0·2% organic mercury fungicide is advised. Heavy shading of transplants should be avoided.

3672. Hanson, W. I., and Hocking, G. M.
Garden sage.
Econ. Bot., 1957, **11**: 64-74, bibl. 31.

This review includes information on geographical sources, the morphology and histology of *Salvia officinalis*, its response to varying photoperiods and its propagation, nutrition, harvesting and drying. Yields and properties of the essential oil are tabulated and the uses of sage and the problem of adulteration are discussed.

Drug plants.

(*See also* 3633, 3712b, d, h, i, l-n, p, u, y, 3996f.)

3673. Anon.
Steroids.
Chemurgic Dig., 1957, **16**(1): 7, from abstr. in *Econ. Bot.*, 1957, **11**: 39.

Among recently isolated steroids of possible value for conversion to cortisone are correlogenin and gentrogenin from *Dioscorea spiculiflora* and smilagenin from *Agave lecheguilla*.

3674. Duncan, W. H., and others.
Toxicological studies of southeastern plants. II. Compositae.
Econ. Bot., 1957, **11**: 75-85, bibl. 11.

This paper is mainly concerned with studies on the response of animals to extracts of 3 *Baccharis* species, which are briefly described. All three are shown to constitute a menace to grazing stock, but in addition there is evidence that they contain one or more active principles which may be of medicinal importance. These include a glycosidal saponin related in activity to digitalis glycosides.—Univ. Georgia.

3675. Abiusso, N. G.
Estudio químico del género *Cassia*. **(Chemical study of the genus *Cassia* [*Senna*].)**
Idia, 1956, Nos. 106/8, pp. 16-17.

Cassia occidentalis, *C. bicapsularis* and *C. subulata* growing in Argentina have been shown to contain anthraquinones, free and combined with glucosides, in their leaves. They will be further investigated for aglucones and sennoside derivatives with a view to reducing imports of senna from India.

3676. Schwartz, S. M.
A preliminary phytochemical investigation of *Digitalis lutea* second year growth.
Diss. Abstr., 1957, **17**: 988, being *Publ.* 20,562 of 133 pp.

Clarification and extraction procedures were investigated, and four new systems of chromatographic technique were developed. The cardiac glycosides present in 2 leaf types, spike and basal, were studied. Crystalline cardiac glycosides were isolated from both types, and were identified as a mixture of α and β acetyl digitoxin. The saponins present in the two leaf types also showed no differences.—Univ. Minnesota.

3677. Loder, J. W., and others.
Diospyrol, a constituent of *Diospyros mollis*.
J. chem. Soc. Lond., 1957, pp. 2233-7, bibl. 10.

The fruit of the shrub *Diospyros mollis* is used in the Far East as an anthelmintic. Its principal constituent appears to be a new tetrahydric phenol, diospyrol, which is closely related to gossypol.—Univ. Liverpool.

Essential oils.

(*See also* 3712c, t.)

3678. Pussard, R.
Biocénose des lavandes. 1. Comportement de la tordeuse *Eulia politana* Hw. (Lép. Tortricidae). **(Ecological association of lavender. 1. Behaviour of the tortrix moth *Eulia politana*.)**
C.R. Acad. Agric. Fr., 1957, **43**: 434-6, bibl. 1.

This pest, common on cultivated lavender and lavandin, can be controlled either by cutting and burning infested bushes in winter, or by repeated dusting, beginning with young larvae, using either parathion or DDT, the last at 10% of active material.—Inst. Rech. agron.

3679. Howe, K. J.
Factors affecting the growth and development of *Mentha piperita* L. with special reference to the formation of essential oil.
Diss. Abstr., 1957, **17**: 730-1, being *Publ.* 20,411 of 262 pp.

The effects of light and temperature on peppermint plants grown in nutrient solutions were studied in controlled environment rooms. Different morphological responses were observed as a result of different constant temperatures. High night temperatures increased oil content. A reduction in light intensity or total light increased the length of the plants but reduced oil content, in comparison with plants grown in normal light. Growth and oil content were drastically reduced under short-day conditions, in comparison with long-day conditions. No normal diurnal rhythm in oil content was observed, although reductions were noted at dawn and dusk. There was a progressive increase in oil content during early growth, reaching a maximum during bud development. Where growth was started early in the season, the leaves contained more oil and glands than did younger leaves in a corresponding position.—Cornell Univ.

3680. Coveney, R. D., and Pickering, G. B.
Vetiver roots from British Guiana.
Colon. Plant Anim. Prod., 1956 (issued 1957), **6**: 63-6.

Exhaustive distillation of air-dried roots of *Vetiveria zizanioides* from the Ebini district of British Guiana yielded 4·6% w/w of oil (≡4·8% of moisture-free material) compared with yields of 0·6 to 3·0% obtained commercially in other countries. If extraction is to be carried out in British Guiana a shorter period of distillation giving somewhat lower yields may prove more conomical. The crowns should be excluded from the ill as they may affect the odour adversely.

Fibres.

(*See also* 3712e, o.)

3681. Crescini, F.
Intorno alla selezione della canapa da tiglio coltivata in Italia. **(Selection of hemp grown in Italy.)** [English and German summaries 8 lines each.]
Sementi elette, 1957, 3(3): 10-16, bibl. 4, illus.

Selection is carried out in 2 stages. In the first fibre content is determined in 70 cm. lengths of stem from middle height downwards, shortly before anthesis. Male and female plants giving the best results are then crossed. The second determination is carried out on stem lengths taken from the same plants when mature. Seed is harvested from those crosses in which the mean of the two results is high for both parents and stem length and diameter are most favourable.

3682. Richardson, J. M.
The fibres of *Australimusa* in relation to abacá improvement.
Trop. Agriculture Trin., 1957, **34**: 207-15, bibl. 9, illus.

The diameter and strength of fibres of five species of *Australimusa*, of hybrids between them and of certain other members of the genus *Musa* have been determined. Results indicate that interspecific crosses of *M. textilis* with *M. peekelii*, *M. angustigemma* and *M. lolodensis* may be of value in abacá improvement programmes. [Author's summary.]—Dep. Agric., Territory of Papua and New Guinea.

3683. Byrom, M. H.
Ramie production machinery.
Agric. Inf. Bull. U.S. Dep. Agric. **156**, 1956, pp. 20, bibl. 3, illus.

This publication describes the progress that has been made at the Everglade Experiment Station, Florida, in developing machinery for large-scale production of ramie. Among successful developments are the use of modified forage harvester to make root cuttings, which are then planted by a mechanical transplanter. Hemp machinery has been modified to provide a harvester which cuts the stalks and ties them into bundles. Crane-type loaders equipped with grabhooks can be used to load the bundles onto field railway wagons. A centrally located extraction plant containing a large raspador-type decorticator can serve 1,500–3,000 acres. Following decortication satisfactory chemical procedures are now available for removing gums and other extraneous matter.

3684. Chouard, —.
Remarques sur les possibilités de la culture perenne, dans le climat parisien, de deux plantes industrielles, le ricin et la ramie. **(Observations on the possibilities of perennial cultivation of two industrially important plants, castor bean and ramie, in the climate of Paris.)**
C.R. Acad. Agric. Fr., 1957, **43**: 255-6.

Castor bean plants can only survive a normal Parisian winter if cut down and transferred to a greenhouse, where growth recommences in late February or March. Though impracticable on a large scale, this procedure should be useful in selection and breeding. Ramie, particularly the white form, produces root suckers with high resistance to cold. In one locality well established plants survived temperatures of −10° to −15° C. for several days without soil protection, but resistance was much lower in those planted as late as June. It was previously known that ramie plants survived well under a thick winter mulch.

3685. Lagan, F. B., and Rapista, E. A.
Response of ramie to ammonium sulfate fertilization in the first harvest and in the first, second and third ratoons.
Philipp. Agric., 1957, **40**: 544-52, bibl. 6, illus.

The Saikeiseisin variety of ramie when fertilized with 7 levels of ammonium sulphate, ranging from 90 to 360 kg./ha., tended to grow taller as the amount of fertilizer increased. Ammonium sulphate had no marked effect on stem branching. All the fertilizer treatments resulted in significantly more fibres and stools than developed in unmanured controls. The tensile strength of the fibre was not significantly affected by the rate of fertilization. These results applied to 4 successive cuts.

3686. Chowdhury, S.
A *Cercospora* leaf spot of ramie in Assam.
Trans. Brit. mycol. Soc., 1957, **40**: 260-2, bibl. 5.

Control of a *Cercospora* disease of ramie, resulting in dark spotting of the leaves, was achieved by 4:4:50 bordeaux, 3 lb./100 gal. Yellow Cuprocide or 3 lb./100 gal. Perenox, 4 applications at monthly intervals being given in each case.

3687. Lock, G. W.
A manurial trial relating to banding disease of sisal.
Emp. J. exp. Agric., 1957, **25**: 219-28, bibl. 10, illus.

'Banding disease' of sisal is due to a deficiency of K. In a manurial trial on K-deficient land responses to N and P were not significant but applying 1,100 lb. of K fertilizer per hectare over the first five years of the life-cycle of the sisal resulted in an increase of 63% in fibre yields. K manuring had no effect upon the rate of leaf production or the number of leaves grown per plant before 'poling' or flowering, but the size and character of the leaf, particularly during the later stages of the experiment, were greatly improved and the healthy sisal yielded more fibre of higher quality than that suffering from banding disease. Calculations show that the cost of the fertilizer may be recovered through the reduction in harvesting expenses per ton of fibre produced, besides enhancing the value of the crop obtained. [Author's summary.]—Sisal Res. Stat., Mlingano, Tanganyika.

3688. Diekmahns, E. C.
A boron deficiency in sisal (*Agave sisalana* Perrine).
E. Afr. agric. J., 1957, **22**: 197-8, illus.

During sand and water culture experiments with sisal plants a leaf cracking symptom appeared, which is described. Rapid recovery occurred when boric acid at 0·66 p.p.m. was added to the nutrient solution. —Sisal Res. Stat., Mlingano, Tanganyika.

J.R.L.

3689. Medina, J. C.
Observações preliminares sôbre *Agave zapupe* Trelease. (**Preliminary observations on *Agave zapupe*.**) [English summary ¼ p.]
Bragantia, 1956, **15** (Suppl.): XXIII–XXVI, illus.

Fibre yield per plant over a 5-year period was about equal to that from *Agave sisalana* during its shorter life cycle. The *A. zapupe* fibres were finer than those of sisal but less elastic, and its spiny leaf margins are a disadvantage in cultivation.

3690. Grignac, P.
Le genêt d'Espagne (*Spartium junceum* L.), plante industrielle. (**Spanish broom (*Spartium junceum*), as an industrial plant.**) [English and Russian summaries ½ p. each.]
Ann. Amél. Plantes, 1956, **6**: 413-79, bibl. 25, illus.

Fibre development was complete only in mature stems, attaining the highest percentage at the end of the first season's growth. Older stems were too woody. For high yield and quality a dry sunny situation was essential and fibre yield was inversely related to stem diameter. Germination percentage reached the low maximum of 35–44% in half-ripe seeds and rapidly fell in later stages of ripening. Dormancy was broken after 6 months of dry storage at ordinary temperature or after 18 days' moist storage at 0° C. Seeds of maximal size and good viability (50–56%) were those harvested from moist situations. Treatment with pure ethyl ether for 20 min. improved germination. Climatic factors, diseases and pests responsible for the decline of natural stands are discussed. An experiment in cultivation showed 2nd and 3rd year yields of about 20 tons per ha. of green stems, the optimal spacing after thinning being 10–20 cm. between plants and 1 m. between rows. Seedlings were susceptible to frost and drought. Weed control was very important in the first year. Insect pests, mainly grasshoppers (*Ephippiger* sp.) and the moth *Mecyna gilvata*, were controlled by BHC and DDT respectively. Attempts at mechanized harvesting have shown little success. Technology and economics are briefly discussed.

Hops.

(*See also* 3336, 3712j, k, w, 4029p.)

3691. Burgess, A. H.
Hop growing and drying.
Bull. Minist. Agric. Lond. **164**, 1956, pp. 62, bibl. 34, illus., 5s.

Dr. Burgess, who was for long associated with hop growing and research at Wye College, has provided an up-to-date survey of the methods of growing and drying hops practised in England. He deals successively with the botany of the hop plant, varieties, propagation, soils, climate, land preparation and planting, training, cultural operations, nutrition, picking, drying and marketing. Diseases and pests are also covered in chapters written by H. H. Glasscock and B. D. Moreton respectively.

3692. Institute of Brewing Hops Advisory Committee.
Institute of Brewing hop trials: 1955 crop.
J. Inst. Brew., 1957, **63**: 312-15.

The results of further brewing trials and soft resin analyses are reported for 5 wilt-tolerant varieties, both as received and after storage. Four of them, D1, D3, J2 and OT48 (Bramling Cross) possess characteristics which make them acceptable as substitutes for at least 25% of the normal hop grist used by brewers. Opinions about the fifth variety V94 (Sunshine) are more divided.

3693. Crocker, W. A.
An experiment to determine the effectiveness of various acaricides in controlling the two-spotted mite on hop vines. [French, Spanish and German summaries ¼ p. each.]
Wallerstein Lab. Commun., 1957, **20**: 141-5.

In a trial in the Yakima Valley parathion, Sytam (schradan) and Systox (demeton) failed to give satisfactory control of *Tetranychus bimaculatus*, whereas good control was obtained with DMC (di(*p*-chlorophenol)methylcarbinol) and satisfactory control with Aramite and Kelthane. It is recommended that the last three compounds should be applied at a rate of 1 lb. active material per acre, starting with the appearance of appreciable numbers of mites in the spring and repeating the application at intervals as reinfestation occurs.

3694. Bishop, L. R.
Comparative studies of methods of hop analysis. III. Recent methods of analysis for α acids and other resin constituents.
J. Inst. Brew., 1957, **63**: 316-30, bibl. in text.

Four of the newer methods were tested. Two polarimetric methods, employing adsorption on silica gel and charcoal respectively, appear to be rather more accurate than the older established methods, and it seems possible that, with improvements in details, a spectrophotometric and a conductometric method may also prove more accurate. The polarimetric and spectrophotometric methods can be relied on to give correct results with old hops, unlike the lead precipitation methods. All four methods are more rapid than the older methods. The studies suggest that some of the chief remaining sources of error may lie in the initial grinding and weighing of the hops, and a possible alternative to mill grinding is discussed.—Stag Brewery, Pimlico, London.

3695. Verzele, M.
Hop analysis—a further revision of the chromatographic-polarimetric method. [French, Spanish and German summaries ⅓ p. each.]
Wallerstein Lab. Commun., 1957, **20**: 7-13, bibl. 7.

The chromatographic-polarimetric method described recently [*H.A.*, 27: 1684] has been modified to permit the use of charcoal in place of silica gel. In this it resembles the procedure adopted by Gough [*H.A.*, 26: 1935], but it has the advantage of taking only 10 instead of 30 to 45 minutes per analysis.

3696. Howard, G. A., and Tatchell, A. R.
Resin composition of hops during ripening and storage.
J. Inst. Brew., 1957, **63**: 333-7, bibl. 4.

The α- and β-acids of hops (Bullion and OR55) develop simultaneously from the early burr stage of the cones. The cohumulone content of the α- and the colupulone content of the β-acids increase concurrently with both the cone size and the total amount of resin development, and attain the levels characteristic of the variety at ripeness. Although the amount of resin in hops usually falls during storage, the compositions of the α- and β-resin fractions normally remain unchanged. Falls in the proportion of the co-analogues can, however, occur on occasion. [Authors' abstract.]—Brew. Ind. Res. Found., Nutfield, Surrey.

3697. Hough, J. S., Howard, G. A., and Slater, C. A.
Bacteriostatic activities of hop resin materials.
J. Inst. Brew., 1957, **63**: 331-3, bibl. 18.

The bacteriostatic activities of humulone, cohumulone, adhumulone and various derivatives of humulone against two *Lactobacillus* spp., and an *Acetobacter* sp. were measured, using a simple haemocytometer technique. The α-acids themselves showed considerable activity against the *Lactobacillus* spp. tested (gram positive) but none was shown against the *Acetobacter* sp. (gram negative). Humulinone and its transformation products had no marked activity. [Authors' abstract.]—Brew. Ind. Res. Found., Nutfield, Surrey.

Insecticidal plants.

(*See also* 3896.)

3698. Hodgson, H. C.
Paper chromatography of the false pyrethrins.
J. Sci. Food Agric., 1957, **8**: 347-50, bibl. 6.

The acids obtained by hydrolysis of pyrethrum flower extracts, which are titrated in the pyrethrin II determination but which are not derived from pyrethrin II, have been investigated. In 3 out of 5 samples of flowers these non-pyrethrin acids, which are probably of no insecticidal value, accounted for over 30% by weight of the total acidic material present. No correlation existed between their content and either the ratio of pyrethrin I to pyrethrin II or the total pyrethrin content.—Scott agric. Lab., Dep. Agric., Kenya.

Rubber plants.

(*See also* 3406, 3712v.)

3699. de León, A., and de Rafols, W.
Sistemas eficientes para el descoronado de la planta cauchífera *Taraxacum kok-saghyx* (Rodin). **(Efficient methods for removing the tops of the rubber plant *Taraxacum kok-saghyz*.)** [English summary ¼ p.]
Collado Montes, M., and de Rafols, W.
Selección del *Taraxacum kok-saghyz* (Rodin). **(Selection of *T. kok-saghyz*.)**
Herrera, J. J., and others.
Aprovechamiento industrial del *Taraxacum kok-saghyz* (Rodin). IV. Alcoholes triterpénicos y esteroles. **(Industrial uses of *T. kok-saghyz*. IV. Triterpenic alcohols and sterols.)** [English summary ¼ p.]
Cadahia, J. R., and de Rafols, W.
Ensayo de multiplicación vegetativa de *Taraxacum kok-saghyz*. **(An experiment on the vegetative multiplication of *T. kok-saghyz*.)** [English summary ¼ p.]
An. Inst. nac. Invest. agron. Madrid, 1957, **6**: 3-19, bibl. 4, illus.; 23-34, bibl. 6, illus.; 37-51, bibl. 10; 55-68, bibl. 5, illus.

(1) Herbicides were more economic than hand or machine labour in removing tops. The most economical results were given by spraying with 3% sodium arsenite at 750 l. per ha. Calcium cyanamide was unsatisfactory, but potassium cyanate at 10% gave good results. Cornox N (diethanolamine 2-methyl 1-4 chlorophenoxyacetate) had no action whatever at the recommended rate. A proprietary mixture of 2,4-D and 2,4,5-T with mineral oil was satisfactory at 0·25%. (2) In a large kok-saghyz population the plants were classified into 5 groups according to leaf margin, which ranged from entire to deeply indented. Frequency-distribution curves for rubber content showed the maximal value of the 4th group with fairly deeply dentate leaves. Another factor correlated with high rubber content was increase in number of roots per plant. The lower region of the root was richer than the upper in rubber, giving an average of 18·47% over the whole population, but for individual plants values above 30% were obtained. (3) Acetone and ethanol treatment of roots showed the presence of triterpenic alcohols and sterols. (4) In propagation tests the optimal length for root cuttings was 2 cm. Rooting substances tested were aqueous solutions and talc containing potassium α-naphthylacetate and the following acids: β-indoleacetic, β-naphthaleneacetic, α-naphthaleneacetic, β-naphthoxyacetic and β-indolebutyric. Talc treatments were more successful than solutions. The best results were obtained with α-naphthylacetate and β-indoleacetic acid at 0·05%.

3700. Marzocca, A.
Variedades mejoradas de kok-saghyz. **(Improved varieties of kok-saghyz.)**
Idia, 1956, Nos. 106/8, pp. 19-21, illus.

From plants of Russian origin containing 5% of rubber in the roots (dry weight) selection of progeny increased this figure to 10·3% and gave 4·54% of resins. The corresponding rubber percentage in roots of plants of Swedish origin was 20·77 after selection and the resin content 5·59%.

3701. Marzocca, A., and Caso, O.
Efectos del tratamiento de semillas de kok-saghyz con radiaciones ultravioletas. **(Effects of ultraviolet radiation treatment on kok-saghyz seeds.)**
Idia, 1956, Nos. 106/8, p. 16.

Kok-saghyz seeds were soaked for 18 hr. and treated with ultraviolet radiation for periods ranging from 30 to 90 min. They germinated more rapidly than untreated seeds and produced larger plants with greater fresh weights of roots and tops and a greater dry weight of roots than the controls.

3702. MARZOCCA, A., AND CASO, O.
Densidad de siembra del kok-saghyz. **(Seeding rate for kok-saghyz.)**
Idia, 1956, Nos. 106/8, p. 21.

In preliminary experiments, dry matter yields of roots in kg. per ha. were 147, 183, 192, 197 and 196 from seeding rates of 4, 6, 8, 10 and 12 kg. per ha. respectively. The seeds were sown in bands 10 cm. wide and 35 cm. apart.

3703. PROKOF'EV, A. A., AND LYUKOVA, L. A.
Development of the latex system in respect to the age and mineral nutrition of plants. [Russian.]
Fiziol. Rast., 1956, **3**: 23-31, from abstr. in *Soils and Ferts*, 1957, **20**, abstr. 1492.

In field experiments 75 kg./ha. N, 70 kg. P_2O_5 and, in particular, 70 kg. P_5O_2+50 kg. N increased the number of rings of latex vessels and the capacity of the latex system of kok-saghyz, but did not affect the general pattern of development of the system. NP increased the proportion of rubber to resin in the latex.

Seed oils.

(*See also* 3041, 3664d, 3712a, f, s.)

3704. SCHOENLEBER, L. G., BOUSE, F., AND COPPOCK, G. E.
A two-row, tractor-mounted castor bean harvester.
Bull. Okla. agric. Exp. Stat. **B-489**, 1957, pp. 11, illus.

A description is given of the USDA-Oklahoma combine harvester. Operated by one man, it harvests by removing the seed capsules, hulls the seed and blows the hulls onto the ground. It has a bin capacity of 1 ton of clean seed and operates at 3½ m.p.h. In tests on dwarf castor beans in several areas the highest harvesting loss recorded was 4·8%. Planting and cultural practices which will aid mechanical harvesting are enumerated.

3705. DE VRIES, E.
L'huile de boleko. **(The oil of *Ongokea gore*.)**
Oléagineux, 1957, **12**: 427-31, illus.

An account is given of the common Central African tree *Ongokea gore* and of the physical and chemical characteristics, extraction, industrial uses and by-products of oil from its seeds.

3706. PITTMAN, D. W., AND DRAPER, C. I.
Safflower: its possibilities and culture in Utah.
Circ. Utah agric. Exp. Stat. **136**, 1955, p. 16, illus.

Trials on the cultivation of safflower and the utilization of its seed oil and meal for stock feed have been in progress in Utah since 1944. By 1954 the development of improved varieties had resulted in an increase in the average oil content of the seed from 29% to 34%. With one irrigation per year yields of seed have ranged from 1,360 to 3,000 lb. per acre compared with nil to 1,340 lb. on dry land.

3707. DALY, J. M., AND SAYRE, R. M.
Relations between growth and respiratory metabolism in safflower infected by *Puccinia carthami*.
Phytopathology, 1957, **47**: 163-8, bibl. 15.

Respiration and tissue elongation rates were almost doubled in safflower after hypocotyl infection by *Puccinia carthami*. Non-infected host tissue was stimulated to a comparable extent by 2,4-dinitrophenol.—Univ. Nebraska, Lincoln.

Sundry plants.

(*See also* 3712g, q, r, x, 4029m.)

3708. GENTRY, H. S.
Gum tragacanth in Iran.
Econ. Bot., 1957, **11**: 40-63, bibl. 7, illus.

Descriptions are given of 11 species of *Astragalus*, among which are 9 reported for the first time to yield gum tragacanth. This brings the total number of species known to yield this gum to 23. The properties and uses of the gum are described, and several factors affecting yields and the prospects for introducing the shrubs to cultivation are discussed.

3709. RAYMOND, W. D., AND SQUIRES, J. A.
The effect of Antiguan well water on the quality of starch extracted from arrowroot rhizomes.
Colon. Plant Anim. Prod., 1956 (issued 1957), **6**: 42-52.

Arrowroot grows well in Antigua, but the lack of suitable water for processing may restrict development. Starch prepared with local well water had a lower viscosity than that prepared with distilled water and would not satisfy the specifications for high grade starch.

3710. JOHNSON, R. M., AND RAYMOND, W. D.
Sources of starch in colonial territories. I: The sago palm.
Colon. Plant Anim. Prod., 1956 (issued 1957), **6**: 20-32, bibl. 10, illus.

Among the points covered in this review are types of sago palm and their cultivation in Sarawak and other far eastern territories, and methods of extracting, processing and using the starch together with information on its composition.

3711. NICHOLAS, G. W.
Rhodesia's nut growing industry expanding.
Reprinted from *Fmrs Wkly, Salisbury*, March 6, 1957, p. 1, illus.

This is essentially an account of the method of cultivating the oyster nut (*Telfairia pedata*) recommended for Southern Rhodesia. Among points made are: The plant is a cucurbitaceous climber growing extremely fast and vigorously so that it is likely to swamp its carrier: the common wild fig is suitable as a carrier. The vine is propagated from seed. It may reach 40 ft. in height and spread very widely given adequate support. It can withstand light frosts. The feeder roots are just below the surface so that top dressings of decomposed leaves stimulate growth. Although male and female plants grow side by side hand pollination is necessary. The nuts are produced, up to 150 a time, in gourds which fall in a pulpy mass from the vine when ripe.

Noted.

712.

a ANDRÉ, É., AND MAILLE, M.
Contribution à l'étude des substances insaponifiables des huiles de graines de crucifères. **(Contribution to the study of non-saponifiable substances in seed oils of cruciferous plants.)**
Oléagineux, 1957, **12**: 359-65.
Sterol and carotene determination.

b BANES, D.
Report on *Rauwolfia serpentina.*
J. Ass. off. agric. Chem. Wash., 1957, **40**: 798-800.
Determination of reserpine and rescinnamine.

c CARSON, N. A.
Report on volatile oil in spices.
J. Ass. off. agric. Chem. Wash., 1957, **40**: 776-81, bibl. 4.
Determination of volatile oil content with the aid of magnetic mixers.

d CHAUDHARY, S. S., SINGH, H., AND HANDA, K. L.
Chemical composition of *Ipomoea palmata* and the pharmacology of its extracts.
Curr. Sci., 1957, **26**: 148-9, bibl. 2.
Tests of muricatin A and B from the seeds.

e COMMONWEALTH ECONOMIC COMMITTEE.
Industrial fibres.
[*Publ.*] *Commonw. econ. Cttee*, 1957, pp. 217, H.M.S.O., Lond., 5s.
A review of production, trade and consumption similar to that abstracted in *H.A.*, 26: 828.

f GIARD, J.
Le ricin dans le monde. **(World production of castor beans.)**
Oléagineux, 1957, **12**: 349-57, bibl. 6.
Uses and production and trade figures.

g GRASSMANN, W., ENDRES, H., AND MÜNCH, N.
Über Sumachgerbstoffe, II. Notiz über die "Gerbstoffsäure" des Hirschkolbensumach. **(On sumac tannins, II. Note on the tannic acids of *Rhus typhina*.)**
Chem. Ber., 1957, **90**: 838-9, bibl. 2.

h GRINER, B. M.
A botanical garden of medicinal plants. [Russian.]
Priroda, 1957, **46**(6): 53-6, illus.
Of the Moscow Pharmaceutical Institute founded in 1946.

i HILAL, S. H.
Organic acids and glycoside biosynthesis in *Digitalis purpurea* L.
Diss. Abstr., 1957, **17**: 730, being *Publ.* 20,383 of 108 pp.
In the leaves.

j HOWARD, G. A., AND SLATER, C. A.
The chemistry of hop constituents. Part X. Structure of a degradation product of humulinone.
J. chem. Soc. Lond., 1957, pp. 1924-5, bibl. 5.

k HOWARD, G. A., SLATER, C. A., AND TATCHELL, A. R.
Chemistry of hop constituents. XI. Some observations on the isomerization of humulone.
J. Inst. Brew., 1957, **63**: 237-48, bibl. 20.
The fate of humulone in beer.

l JOSHI, D. V., TAMHANE, R. G., AND DUTTA, N. K.
Chemical and pharmacological investigation of roots of *Wagatea spicata* Dalzell.
Curr. Sci., 1957, **26**: 147-8, bibl. 4.
Yielding 2% vakerine of doubtful value.

m KIDD, D. A. A.
Alkaloids of *Rauwolfia* species: preliminary studies on *Rauwolfia cambodiana.*
Chem. Ind. Lond., 1957, No. 29, p. 1013, bibl. 8.
Dried roots yielded 3·5% alkaloids but only 0·01% reserpine.

n KLOHS, M. W., AND OTHERS.
Alkaloids of *Rauwolfia canescens* Linn. IV. The structure of pseudoreserpine.
J. Amer. chem. Soc., 1957, **79**: 3763-6, bibl. 11.
A new alkaloid with hypotensive and sedative activity.

o LOCK, G. W.
Some aspects and problems of sisal growing in East Africa.
Trop. Agriculture Trin., 1957, **34**: 190-8, bibl. 7, illus.

p LUTTERMOSER, G. W., AND BOND, H. W.
Anthelmintic activity of the fruits of *Diospyros mollis* (Maklua) and tests for activity of other persimmons.
Proc. helm. Soc. Wash., 1957, **24**: 121-4, bibl. 7.

q OSSOWSKI, L. L. J.
The biological control of the wattle bagworm (*Kotochalia junodi* Heyl.) by a virus disease. 1. Small-scale pilot experiments.
Ann. appl. Biol., 1957, **45**: 81-9, bibl. 16.
Results of field trials encouraging.

r PACI, C.
Antibiotici prodotti dalle piante superiori. **(Antibiotics produced by higher plants.)**
Ital. agric., 1957, **94**: 543-5, bibl. 1.
A review, with special reference to the inhibiting effects of tulip sap on micro-organisms.

s PATHAK, S. P., AND DEY, L. M.
Fatty acids of the seed fat of *Pongamia glabra*.
J. chem. Soc. Lond., 1957, p. 1917, bibl. 8.

t PUSSARD, R.
La culture des lavandes gravement menacée par la cécidomyie, *Thomasiniana lavandulae* Barnes. **(Lavender cultivation seriously threatened by the cecidomyia *Thomasiniana lavandulae*.)**
C.R. Acad. Agric. Fr., 1957, **43**: 333-6, bibl. 6.
With suggestions for research on control measures.

u RENKONEN, O.
Über Glykoside aus Samen von *Strophanthus divaricatus* (Lour.) Hook et Arn. **(Glycosides in seeds of *Strophanthus divaricatus*.)**
Suom. Tiedeakat. Toim. Chem., 1957, **83**: 7-72, bibl. 52, illus.

v SÍVORI, E. M., AND CASO, O. H.
Plantas caucheras autóctonas. **(Rubber plants indigenous to Argentina.)**
Idia, 1956, Nos. 106/8, p. 17.
Parthenium glomeratum found to contain rubber latex.

w THOMPSON, F. C.
Hops—recent work at Wye College.
J. Inst. Brew., 1957, **63**: 200-4, bibl. in text.
An outline of research on field problems and drying.

x WHITE, T.
Tannins—their occurrence and significance.
J. Sci. Food Agric., 1957, **8**: 377-85, bibl. 41, illus.
Including use in plant protection.

y WIBAUT, J. P., AND HOLLSTEIN, U.
Investigation of the alkaloids of *Punica granatum* L.
Arch. Biochem. Biophys., 1957, **69**: 27-32, bibl. 10.
The anthelmintic activity of pomegranate bark extracts is chiefly due to isopelletierine.

FLORICULTURE.

General.

(*See also* 3079, 3338d, 3815a, o, p, u, w, y, 3816b, k, n, p, q, 4005, 4029t.)

3713. MAMELI-CALVINO, G. E.
Relazione dell'attività svolta dalla stazione sperimentale di floricoltura nell'anno 1955. **(Report on the work of the Floricultural Station San Remo for 1955.)** [English summary 7 lines.]
Ann. Sper. agrar., 1957, **11**(3), Suppl. pp. CXCII-CCXXV, illus.

The work included breeding and selecting carnations, roses, freesias, nerines and other flowering plants. Rose rootstock investigations in the open are reported on *R. indica major*, *R. indica major* × *R. multiflora*, Dr. Huey, *R. canina* and *R. laxa*. They indicate that *R. indica major* remains unsurpassed for vigour, productivity, length of stems and absence of chlorosis. Further trials are proposed to determine whether *R. canina* and *R. laxa* are not more suitable for particular varieties. In addition a stock from Uruguay, as well as *R. indica multiflora* var. Muraour, Sunny South and a seedling 70,459 are to be tested. Foliar application of fertilizers was disappointing except for chrysanthemums. The effect of 40% maleic hydrazide on retarding bud break of Pollard peach trees, *Persea drymifolia*, carnations and roses was found to be trifling. Favourable effects of potash manuring on flower production in carnations were noted and a separate account is promised. Lithium salts, especially 1% nitrate and chloride, also favoured stronger and more rapid growth, earlier flowering and more and finer flowers in carnations, but the carbonate salt was found to cause damage. A report is in the press.

3714. CARPENTER, W. J., AND WILLIS, W. W.
House plants—their selection and care.
Circ. Kans. agric. Exp. Stat. **339**, 1957, pp. 40, illus.

Nearly half this publication is concerned with general aspects of house-plant culture, including environmental needs, repotting and fertilizing, pests and diseases, and methods of propagation. The remainder provides short notes on the culture of a large number of foliage, flowering, and succulent plants.

3715. SAITO, K.
Studies on the induction of polyploid flower plants and their utilization. X. On the autotetraploid plants of Calabrian soapwort, common Californian poppy, cosmos and rose campion. [Japanese, with English summary ⅓ p.]
J. hort. Ass. Japan, 1957, **25**: 261-4, bibl. 5, illus.

Colchicine-induced tetraploids differed from the original diploids as follows. *Cosmos bipinnatus* produced stiffer stems and longer leaves. *Eschscholtzia californica* had larger flowers with broader petals, but very few seeds. *Lychnis coronaria* had not flowered when data were published, but the leaves were thickened. *Saponaria multiflora* produced larger plants, larger and later flowers and abundant seed.

3716. DUNHAM, C. W., HAMNER, C. L., AND ASEN, S.
Cation exchange properties of the roots of some ornamental plant species.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 556-63, bibl. 11.

The cation exchange capacity of the roots of 16 species of ornamental plants was determined. Plants closely related botanically had similar root exchange capacities. Most species had a root exchange capacity between 25 and 45 m.e./100 g. of dry weight. Annual larkspur had a root exchange capacity of near 100 m.e./100 g. of dry weight. Analysis of tops of plants grown in nutrient solutions of varying K and Ca concentrations showed root exchange capacity to be one factor influencing the chemical composition of the tops in solutions of low ionic activity. There appeared to be no relationship between either total salt absorption or nutrient requirement and root exchange capacity. [Authors' summary.]—Mich. St. Univ., E. Lansing.

3717. Kohl, H. C., Jr., and Kofranek, A. M.
Gibberellin on flower crops.
Calif. Agric., 1957, **11**(5): 8, illus.

The response of a number of flowering plants to treatment with gibberellins varied markedly according to the species. The leaf petioles, but not the stems, of *Strelitzia regina* seedlings became greatly elongated. Stem elongation occurred in hydrangeas, in which growth had been checked by lack of low temperature treatment, and in short-day plants (poinsettia, chrysanthemum and kalanchoë) growing under long-day conditions, but flowering was not hastened. Neither elongation nor flowering occurred in stocks (*Matthiola incana*) held at 60° F. With *Cyclamen indicum* gibberellins applied at 100 g. per plant each week from May 23 to July 24 caused rapid flower development during the summer, but the flowers did not reflex fully.—Univ. Calif., Los Angeles.

3718. Ruge, U.
Über den Abfall von Blüten und Blütenblättern. **(On flower and petal drop.)**
Angew. Bot., 1957, **31**: 126-9, bibl. 6, illus.

Sprays of 10–300 mg./l. 2,4-D delayed flower drop of cut antirrhinums, clarkias, delphiniums, and eschscholtzias. Flower drop of begonia plants in pots was delayed by spraying, but subsequent development was abnormal. Camellia flowers did not respond to a 2,4-D spray. In camellia pedicels the tannin content was much higher after the flower had dropped than just after flower opening, and it is suggested that the high tannin content may have a toxic effect on the cells of the pedicel. In *Hibiscus rosa-sinensis* there was a much higher content of calcium oxalate crystals in the pedicels of faded or fallen flowers than in those of buds.—Tech. Hochsch., Hannover.

3719. Stinson, R. F.
Algal growth and the performance of flowering plants in clay pots treated with copper naphthenate.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 564-8, bibl. 2, illus.

The growth of algae on clay flower pot surfaces under greenhouse conditions was effectively controlled by dipping the pots for 10 seconds, 2–3 days before use, in mineral spirit solutions or water emulsions of copper naphthenate containing 1·1 to 3·0% Cu. Five of the six test plants grown in the treated pots exhibited a change in root distribution but were not otherwise affected.—Univ. Conn., Storrs.

3720. Rhodes, A., and others.
Small-plot trials of griseofulvin as a fungicide.
Ann. appl. Biol., 1957, **45**: 215-26, bibl. 5.

Griseofulvin has been shown to give marked control of tulip fire (*Botrytis tulipae*) and chrysanthemum mildew (*Oidium chrysanthemi*) under both garden and commercial conditions. The protection obtained, depending upon formulation or method of application, compared favourably with accepted control methods, such as ferbam for tulip fire and Karathane for chrysanthemum mildew. In preliminary experiments promising results were also obtained against grey mould of lettuce (*Botrytis cinerea*). Griseofulvin foliage sprays on the three crops studied showed relatively little gain in disease control by increasing the concentration of active ingredient. A much greater response, seen as complete protection from mildew, was obtained when griseofulvin was applied to chrysanthemum roots, rather than as a foliage spray, suggesting that it may be more effective when acting within the plant as a systemic. [From authors' conclusions.]—Glaxo Lab. Ltd., Stoke Poges.

3721. (Rogers, M. N.)
PCNB is outstanding against rhizoctonia.
Flor. Exch., 1957, **128**(21): 11.

Pentachloronitrobenzene (PCNB or Terrachlor) has given excellent control of rhizoctonia stem rot of carnations, either as a drench (75% w.p. at 1 lb. in 100 gal. per 400 sq. ft.) or as a dust (75% formulation at 2–3 lb. per 1,000 sq, ft.), both applied to the soil. PCNB drench at 1½ lb. per 100 gal. did not, however, control rhizoctonia stem rot of poinsettia cuttings in sand. Against this disease Panogen at 10 fluid oz. per 100 gal. or Semesan at 2 lb. per 100 gal. were effective, but both materials caused stunting if used at too high a concentration.

3722. Cory, E. N., and Highland, H. A.
Control of some pests of ornamentals.
J. econ. Ent., 1957, **50**: 86-9, bibl. 8.

In the tests described the best results were obtained against: boxwood psyllid (*Psylla buxi*) with malathion spray; boxwood leaf miner (*Monarthropalpus buxi*) with Systox soil or foliage treatment; euonymus scale (*Unaspis euonymi*) with DNC spray in the dormant season and malathion in the summer; and holly leaf miner (*Phytomyza ilicis*) with Systox trunk or soil treatment.—Univ. Md, College Park.

3723. Mariconi, F. A. M., and Zamith, A. P. L.
Notas sôbre um sério depredador de flores. **(Notes on a serious pest of flowers.)**
Biológico, 1957, **23**: 41-9, bibl. 18, illus.

In laboratory experiments the beetle *Macrodactylus pumilio* was resistant to DDT. It was killed rapidly by BHC, lindane and parathion, but more slowly by aldrin, dieldrin, isodrin and endrin. Malathion gave variable results. BHC gave an unpleasant odour. An emulsion of lindane in diesel oil applied in the field by means of a "swingfog" mister gave complete control of the pest, but seriously damaged the flowers of rose, daisy, aster and dahlia. [See also *H.A.*, 27: 1786.]

3724. Wolfenbarger, D. O.
EDB properly used against medfly does not injure nursery and greenhouse plants.
Sunshine St. agric. Res. Rep., 1957, **2**(1): 3, illus.

To prevent the spread of Mediterranean fruit fly Florida growers are required to treat plants before shipment from one region to another. Ethylene dibromide (EDB) emulsion will destroy fruit fly larvae and pupae infesting nursery plants or soil around their roots. In tests on potted plants of many species the great majority showed no damage when they were dipped in EDB, 1 part to 15,000 parts water, or when the same concentration was applied by pouring. Among the few plants listed as sensitive were species of *Cissus* and *Ixora*.—Fla. subtrop. Exp. Stat.

3725. Morishita, F. S., and Jefferson, R. N.
Cyclamen mites on ornamentals effectively checked by endrin.
Flower Notes, No. 18 reprinted in *Flor. Exch.*, 1957, **128**(17): 11.

Endrin, applied for the control of cyclamen mite, did not appear to damage or stunt azalea, *Hedera*, cyclamen, gloxinia or saintpaulia plants. The recommended dosage is 0·4 lb. endrin per 100 gal. water, and 3 sprays should be applied at 3-week intervals, the series being repeated 4 to 5 months later. Hygiene remains an important factor in control.—Univ. Calif., Los Angeles.

3726. Smith, F. F.
A résumé of spider mite control in greenhouses.
Flor. Exch., 1957, **128**(18): 10, 36-40.

Red spider mite (*Tetranychus telarius*) on ornamental plants in the glasshouse can be almost completely eradicated by azobenzene, HETP, TEPP or parathion used as fumigants, sprays or aerosols. Some strains, however, have developed resistance to parathion and many other acaricides. Combination sprays of azobenzene-Aramite or schradan-Aramite are usually effective, but care is needed to avoid bleaching the flowers or damaging the foliage. The use of misting equipment to increase the humidity helps to control resistant strains.—Agric. Res. Serv., U.S. Dep. Agric.
J.R.L.

Annual and herbaceous plants.

(*See also* 3039, 3815b, f, i, k, l, v, x, 3816i, l.)

3727. Lunt, O. R., and Kohl, H. C., Jr.
Influence of soil physical properties on the production and quality of bench grown carnations.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 535-42, bibl. 15.

Carnations were grown for over 18 months in compartments containing 9 sterilized soil mixtures about 8 in. deep. The mixtures consisted of a loamy sand, with and without peat, and a silty-clay loam, alone and with additions of pine shavings, pumice, VAMA, peat, fir bark and redwood shavings. The containers were irrigated with a nutrient solution whenever the tension reached about 0·5 bar. Numbers of blooms, flower head weights, shoot weights and stem lengths were recorded. Variations in these measurements were for no treatment greater than 3·5% from the mean of all the treatments. The silt loam soil, in which aeration was expected to be a limiting factor, released only about 2% of its water volume over the range 0 to 100 millibars, but, under the conditions prevailing, aeration was sufficiently improved by transpiration which developed about 2·5% free porosity per day.—Univ. Calif., Los Angeles.

3728. Sagawa, Y.
Nitrogen as a modifying factor in the growth and flowering response of carnations to radiation.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): 1.

Doses of X-rays from 625–7,500 r applied in air or oxygen to Pink and White Sim carnations resulted in shorter plants, precocious flowering and the production of flowers of more than one colour. The effects were modified in a nitrogen atmosphere. When irradiated with 5,000 r in air, plant height was reduced by approximately 35% and flowering was hastened as compared with control plants and those irradiated in nitrogen, which were indistinguishable from one another.—Brookhaven nat. Lab., Upton, L.I., N.Y.

3729. Beck, G. E., Holm, L., and Struckmeyer, B.E.
The effect of maleic hydrazide on vegetative growth and flower production of carnation (*Dianthus caryophyllus* L.).
Proc. Amer. Soc. hort. Sci., 1957, **69**: 523-34, bibl. 13, illus.

The results of experiments are reported using MH as a substitute for manual pinching to force the development of axillary branches in carnation. Young carnation plants were sprayed with 500, 1,000 and 1,500 p.p.m. of the chemical 4 weeks after planting. Terminal buds were removed from the control plants at the time the treated plants were sprayed. Growth measurements revealed that the axillaries of the treated plants grew at a slightly reduced rate for the first 6 weeks. Thereafter, both treated and control plants grew at a more uniform rate. An increase in the quality of flowers was shown for plants treated with MH. Terminal and axillary growing points of plants treated 2 weeks after planting showed greater anatomical abnormalities than did the growing points of plants treated 4 to 6 weeks after planting. In the affected portions cells were enlarged and disorganized. Differentiation of floral parts was somewhat delayed in stem tips that were treated. The systems through which MH may be affecting the pattern of plant growth are discussed. [Authors' summary.]—Univ. Wis., Madison.

3730. (Mahlstede, J. P.)
Your experiment station reports. Test freezing of perennials.
Ia Fm Sci., 1957, **11**(9): 24, illus.

It has been found that carnation and strawberry plants held in cold storage (28° F.) can be shipped without thawing in sealed polythene bags covered with aluminium foil and overwrapped with polykraft paper. Polythene-bagged perennials placed in the centre of orange crates took an average of 14 hours to reach the storage temperature, whereas plants on the outside took only about 3 hours.

3731. DULLFORCE, W. M.
Timing chrysanthemum flowering.
Grower, 1957, **47**: 1413-16, illus.

A chart is given summarizing the flowering behaviour of 7 chrysanthemum varieties under artificially lengthened days and varying cultural procedures. Mid-season and November flowering varieties were used, and the additional lighting was started about the third week in August.—Univ. Nott. Dep. Hort., Sutton Bonington.

3732. DUFFETT, W. E.
Experiments prove interrupted lighting improves winter chrysanthemums.
Ohio Flor. Ass. Bull., reprinted in *Flor. Exch.*, 1957, **128**(17): 49, 51.

The flower quality of 3 Indianapolis varieties was improved by allowing a short period of long days during bud development in comparison with continuous short-day treatment. The schedules used are described.

3733. REISCH, K. W.
Studies on the effect of light on the flowering of the greenhouse chrysanthemum (*Chrysanthemum morifolium*).
Diss. Abstr., 1957, **17**: 942-3, being *Publ.* 20,714 of 122 pp.

In long-day conditions, applied to Jewell chrysanthemum plants, the dark period was interrupted by a 30-minute period of incandescent light which was followed by far-red light for varying periods. The treatment resulted in partial negation of the effect of delayed bud development. Short periods of far-red light (8, 10 or 15 min.) were more effective than longer periods.—Ohio St. Univ.

3734. SCHWABE, W. W.
Factors controlling flowering in the chrysanthemum. VI. De-vernalization by low-light intensity in relation to temperature and carbohydrate supply.
J. exp. Bot., 1957, **8**: 220-34, bibl. 6.

The importance of the interaction between temperature and low-light intensity treatment in the de-vernalization of the chrysanthemum has been confirmed. Low-intensity light caused no de-vernalization at, or just above, 18° C., but at 23° C. 4 weeks of low light gave a considerable response, and at 28° C. it was practically complete. This effect of low-light intensity implicates carbohydrate supply as a possible factor in the de-vernalization reaction. The experiments described indicated, however, that lowering carbohydrate level by defoliation in full light did not cause de-vernalization, nor was complete darkness any more effective than dim light. Conversely, sugar feeding during low-light treatment failed to prevent de-vernalization. Stem elongation rates and leaf expansion rates confirmed that substantial amounts of sugar were in fact taken up, high rates being maintained in sugar-fed plants in contrast to the low rates of the water controls. Return to full light caused a rapid drop in stem elongation rates while increasing those of leaf expansion. Thus, while carbohydrate starvation may have a subsidiary effect, it would not appear to be the main factor involved in low-light intensity de-vernalization. Vernalization of etiolated plants and re-vernalization of de-vernalized plants also suggest that carbohydrate status is not the overriding factor in the vernalization reaction itself. [Author's summary.]—Imp. Coll. Sci. Tech., London. [For previous parts see *H.A.*, 21: 1883; 22: 781; 23:998 and 2079; 26: 1979.]

3735. CATHEY, H. M.
Chrysanthemum temperature study. F. The effect of temperature upon the critical photoperiod necessary for the initiation and development of flowers of *Chrysanthemum morifolium*.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 485-91, bibl. 6.

Two experiments are described in which 5 varieties, taking 6, 8, 10, 12 and 15 weeks from the start of short photoperiods to anthesis, were used. The plants were subjected to 7 photoperiod treatments ranging from 9 to 16 hours and to 3 minimum night temperatures (50°, 60° and 80° F.). Temperature altered the critical photoperiod necessary for flower initiation and development in all the varieties. The longer the normal period needed to bring a given variety to flower under natural autumn conditions the shorter was the photoperiod needed for flower bud formation and development. The photoperiod required for inflorescence initiation was shortened by lowering the temperature, whereas that required for flower development was shortened by raising the temperature. At the lowest temperature (50° F.) there was no difference in the critical photoperiod for initiation and development of the flower; when the flower buds were initiated they developed slowly.—Cornell Univ., Ithaca, N.Y. [For earlier work see *H.A.*, 25: 4188-4190 and 26: 3966.]

3736. VINCE, D., AND MASON, D. T.
The effect of removing apical sections of the stem on the flowering behaviour of non-vernalized chrysanthemums.
J. hort. Sci., 1957, **32**: 184-94, bibl. 11.

Following removal of the apices of non-vernalized Sunbeam chrysanthemums laterals developed which flowered rapidly in short photoperiods. Control plants continued to show rosette growth. Flowering of non-vernalized plants in response to decapitation was not increased by partial chilling. Decapitation of fully vernalized plants delayed flowering. In non-vernalized plants there was no response to decapitation when it was done earlier than 20 weeks from the date of potting, and the maximum response (100%) occurred when the plants were decapitated after more than 28 weeks of growth in short photoperiods. In 3 other experiments, however, 100% flowering was obtained after cutting back when the plants were between 22 and 26 weeks old, an effect which may have been due to greater plant size. Sprays of B-indolyl acetic acid of 2,3,5-tri-iodo benzoic acid did not affect flowering of laterals on intact plants. The flowering behaviour of Sunbeam after decapitation was not affected by the application of long photoperiods for 4 weeks before short day treatment. In President only a small number of laterals flowered when decapitation was immediately followed by short photoperiods, but when a 4-week period of long days followed decapitation, about 50% the laterals subsequently flowered in short days.—Univ. Reading. [For a preliminary report see *H.A.*, 25: 819.]

3737. MASTALERZ, J. W., AND CAMPBELL, F. J.
Maleic hydrazide—a substitute for pinching potted chrysanthemums.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 511-17, bibl. 5, illus.

Although a concentration of 400 p.p.m. MH was effective in breaking the apical dominance of potted chrysanthemums the treatment cannot be recommended for commercial use.—Univ. Mass., Waltham.

3738. ALLERTON, F.
Spraying against manganese deficiency.
Gdnrs' Chron., 1957, **141**: 515.

Manganese deficiency appears in some varieties of chrysanthemum if the pH is above 6·0. Soil applications of Mn as manganese sulphate or even as a chelated salt are not successful. It is recommended to spray with ½ oz. manganese sulphate per gal. when the breaks are 3–4 in. long, and again 3 weeks later.
J.R.L.

3739. YAMADA, S.
Experiments on the epidemiology and control of chrysanthemum white rust, caused by *Puccinia horiana* P. Henn. [Japanese, with English summary ⅓ p.]
Ann. phytopath. Soc. Japan, 1956, **20**: 148-54, bibl. 13, illus., reprinted as *Mem. Tôkai-Kinki agric. Exp. Stat. hort. Div.* **19**.

Wettable sulphur effectively inhibited germination of teleutospores and sporidia, and is recommended for control of the disease. Teleutospore germination was also inhibited by sodium pentachlorophenate and flowers of sulphur.

3740. WISE, K. A. J.
Trials for control of chrysanthemum gall midge (*Diarthronomyia chrysanthemi* Ahlberg).
N.Z. J. Sci. Tech., Sect. A., 1957, **38**: 728-34, bibl. 2, illus.

Sprays of 0·025% and 0·0125% parathion applied weekly were effective in preventing infestation on the variety Harbinger and also gave good control of the insects within the galls. Fortnightly applications controlled infestations but did not prevent attacks. Parathion was outstandingly better than nicotine sulphate, BHC, or DDT. Of 43 varieties tested none was immune to attack by the midge, but Chartreuse Rialgar, Dulcina and Frances were only slightly affected, whereas Lesma Day, Mrs. W. Duckham and Venice suffered heavy infestations.—D.S.I.R., Auckland.
J.R.L.

3741. GOLIGHTLY, W. H., AND FRENCH, N.
Control of chrysanthemum stool miner.
Plant Path., 1957, **6**: 64-5, illus.

Schradan (0·3%) and Metasystox (0·1%) gave effective control of leaf miner (*Psila nigricornis*) when watered on boxed, infested chrysanthemum stools. Preventive sprays of dieldrin applied round the base of the plants in late summer reduced infestation by 98%.—N.A.A.S., Newcastle-upon-Tyne.

3742. MURRAY, H. R., AND OTHERS.
Boron nutrition of softwood cuttings of geranium and currant in relation to root development.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 498-501, bibl. 4.

Softwood cuttings of geranium (*Pelargonium zonale*) and black currant (*Ribes americanum*) were set in sand, which was supplied with a complete nutrient solution in which the concentration of B was varied (0·0, 0·1, 1·0, 5·0, 10·0 p.p.m.). In a second trial geranium cuttings were rooted in both sand and water culture with 4 B treatments (0·00, 0·01, 0·50 and 10·00 p.p.m.). B had no effect on the initiation of rooting but proved essential to healthy growth, as measured by the weight of roots and shoots produced. The geraniums and currants showed similar minimal and optimal B requirements. Toxicity symptoms developed in the currants at the B concentrations of 5 and 10 p.p.m. and in geraniums at 10 p.p.m.—MacDonald Coll., Quebec.

3743. STODDARD, E. M.
A *Fusarium* rot of geraniums and its control.
Plant Dis. Reptr, 1957, **41**: 536.

It has been shown that a *Fusarium* sp., as well as *Xanthomonas pelargonii*, can cause black leg of geranium cuttings. The *Fusarium* disease causes a rapid rotting of the buried stem before roots can be produced; it does not become systemic. It can also infect the roots after the rooted cuttings are potted. Control of both the *Fusarium* and the bacterial black leg was obtained by using soil drenches containing a mixture of 250 p.p.m. oxyquinoline sulphate and 200 p.p.m. streptomycin.—Conn. agric. Exp. Stat., New Haven.

3744. EDWARD, J. C.
Leaf and inflorescence blight of *Tagetes erecta* (marigold) caused by *Alternaria zinniae* Pape.
Sci. and Cult., 1957, **22**: 683-4, bibl. 1, illus.

Alternaria zinniae has been identified as the organism causing a serious blight of marigolds at the Allahabad Agricultural Institute. Effective control was obtained with Dithane sprays.

3745. SCHUTT, K., AND GOTZY, M.
Einfluss des Topfmaterials auf das Wachstum der Pflanzen. (**The influence of pot composition on plant growth.**) [English, French and Spanish summaries 4 or 5 lines each.]
Mitt. Klosterneuburg, Ser. B, 1957, **7**: 151-3, bibl. 2.

The growth of *Primula obconica* was best in ordinary clay pots. The poorest growth was made by plants in aluminium and in polythene pots. Lacquered clay pots were inferior to plain clay pots.

3746. MORENO, A. F.
Nemátodo en prímula. (**A nematode of primulas.**)
Idia, 1956, Nos. 106/8, pp. 57-8.

Ditylenchus dipsaci, causing serious damage to *Primula obconica*, was controlled to the extent of 90% by spraying with 0·1% active Systox. Although a 0·2% spray killed every nematode this concentration was toxic to the plants.

747. Kohl, H. C., Kofranek, A. M., and Lunt, O. R.
Effects of various ions and total salt concentrations on *Saintpaulia*.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 545-50, bibl. 4.

African violets grown in sand culture showed a decrease in growth when a complete nutrient solution containing more than 13 m.e./l. total salts was applied to them. The plants showed a high ability to accumulate Na, especially in the older leaves. Moderate excess of Na, Cl, SO_4 and Ca ions did no particular harm. The NH_4 ion in moderate excess was very harmful to the experimental plants. At low nutrient concentrations, addition to Na_4SO_2 in moderate amounts increased growth. [From authors' summary.]—Univ. Calif., Los Angeles.

748. Shuel, R. W.
Some aspects of the relation between nectar secretion and nitrogen, phosphorus and potassium nutrition.
Canad. J. Plant Sci., 1957, **37**: 220-36, bibl. 24.

The influence of mineral nutrition on nectar secretion both *per se* and in relation to certain aspects of growth and development was studied in snapdragon and red clover plants growing in sand culture. Snapdragon was grown at two levels each of N, P, and K, red clover at three levels each of P and K. The volume of nectar and weight of nectar sugar secreted per inflorescence were affected by the supply of each of the elements studied. Secretion in snapdragon was favoured by the lower levels of N, P, and K. Secretion in red clover was best at the low and intermediate levels of P and at the intermediate level of K. Although a high concentration of P or K in the mineral supply reduced secretion in both species, the threshold concentration for this inhibitory effect was higher in red clover than in snapdragon. High concentrations of K consistently reduced the sugar concentration of the nectar in both species. Flower number as well as quantity of secretion per inflorescence varied with nutritional treatment. For maximal production of nectar by the plant, the following conditions of fertility would appear desirable: A level of N low enough to avoid excessive vegetative growth, a level of P sufficient to promote good flowering, and a level of K which is neither low enough to limit growth severely nor high enough to reduce flower production. [Author's abstract.]—Ontario agric. Coll., Guelph.

749. Petersen, H.
Artificial irradiation of commercially grown snapdragons.
Yearb. roy. vet. agric. Coll. Copenhagen, 1957, pp. 67-82, bibl. 5, illus.

Three varieties of snapdragon, Golden Spike, Jackpot and Margaret, were exposed to several supplementary light treatments with incandescent and fluorescent lamps. Results indicate the possibility of using such light economically in growing antirrhinums. Treatment with fluorescent light yields a product much ahead of a normally grown crop and of optimal appearance and quality. Incandescent lamps induced extreme earliness. It was shown that light should be applied during the night and only when the seedlings are small. The intensity used was about 100 watts per square metre.—Floric. Dep., Cornell Univ.

3750. de Stigter, H. C. M.
Bloeiversnelling bij "100%-dubbelbloeiende" violieren door bijbelichting tijdens de opkweek. (**Accelerating flowering of "100% double-flowered" stocks by additional lighting during the seedling stage.**) [English summary ½ p.]
Meded. Dir. Tuinb., 1957, **20**: 310-16, bibl. 3, illus.

Three winter sowings of stocks, sown at monthly intervals, were given additional lighting until the transplanting stage. Flowering was accelerated in the November sowing by about 3 weeks, but the difference became less with later sowings owing to the increase in natural light. Leaf numbers were markedly affected by sowing time and light; there was a decrease in leaf numbers with successive sowings without additional light, but an increase with additional light. Single-flowered plants had an average of 3–4 more leaves than double-flowered plants. In summer sowings doubles flowered earlier than singles.—Lab. Tuinbouwpl., Wageningen.

Bulbs, tubers, etc.

(*See also* 3034, 3035, 3066, 3075, 3090q, t, 3712r, 3720, 3815d, e, q, 3816a, d, s.)

3751. Gould, C. J. (Editor).
Handbook on bulb growing and forcing for bulbous iris, Easter lilies, hyacinths, narcissus, tulips.
[*Publ.*] *Northwest Bulb Grs' Ass.*, 1957, pp. 176, illus.

Several American authorities have contributed to this handbook, in which the main facts about bulb growing, storing and forcing have been assembled for commercial growers.

3752. Hollings, M.
Anemone mosaic—a virus disease.
Ann. appl. Biol., 1957, **45**: 44-61, bibl. 17, illus.

The name anemone mosaic is proposed for a previously unrecorded virus disease of *Anemone coronaria* L.; infected plants have mottled leaves, and broken and distorted flowers. The virus can cause winter browning, and can contribute to crinkle in anemones. The virus infected 47 out of 90 plant species tested; it was transmitted by mechanical inoculation, and by 4 of the 6 aphid species tested. Most aphids ceased to be infective within 30 min. when continuing to feed after leaving an infected plant. Weeds naturally infected with AMV were found in anemone plantations and this virus was detected, together with cucumber mosaic and tobacco necrosis viruses, in corms imported into this country. [From author's summary.] The only control measures that can be recommended at present are roguing, spraying against aphids, the removal of weeds, and possibly the use of barrier crops. —Plant Path. Lab., Harpenden.

3753. Rohloff, I.
Weitere Untersuchungen über die Keimung der Samen von *Cyclamen persicum* (Mill.). (**Further studies on seed germination in *Cyclamen persicum*.**)
Saatgut-Wirtsch., 1957, **9**: 153-5, bibl. 8, illus.

Blotting paper used as a substrate retarded the germination of cyclamen seed at 15–16° C. and 20–21·5° C. by comparison with standard compost. There was no apparent difference between rain water and mains water on germination in standard composts. [For earlier results see *H.A.*, 26: 2988.]

3754. Maatsch, R., and Kaever, R.
Schnittblumenerträge bei Cyclamen III. (**Cut-flower yields from cyclamen. III.**)
Gartenwelt, 1957, **57**: 162-3, illus.

In further studies on cut-flower yields from cyclamen the varieties Leuchtendrot and Lachshell were used. Flowers were cut from Leuchtendrot from the end of August, and from Lachshell from the end of September, until the trial finished in mid-February. Total yields from the latter averaged about 10 flowers per plant less than from Leuchtendrot. Short-stemmed flowers were only occasionally produced.—Inst. Zierpflanzenb., Techn. Hochsch., Hannover. [For parts I and II see *H.A.*, 26: 905 and 3977.]

3755. Foschi, S.
L'antracnosi del ciclamino. (**Anthracnose of cyclamens.**)
Inf. fitopat., 1957, **7**: 64-5, illus.

No detailed experiments have been carried out on control of *Gloeosporium cyclaminis*, but suggested treatments are immersion of the shoots in thiram, organic mercury or dithiocarbamate solutions, which are allowed to run among the newly formed buds when the plant is replaced upright. Spraying with copper oxychloride has given moderate, and with bordeaux mixture poor, results.

3756. Dogonadze, D. S.
Vegetative hybrids of dahlia and chrysanthemum. [Russian.]
Agrobiologija, 1957, No. 1, pp. 127-8.

The seedling of a dahlia grafted on a yellow chrysanthemum acquired an improved resistance to light autumn frosts, i.e. its resistance became similar to that of the chrysanthemum.

3757. Kofranek, A. M., Lunt, O. R., and Kohl, H. C., Jr.
Tolerance of gladioli to salinity and boron.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 556-60 bibl. 12.

Gladioli are relatively sensitive to moderate levels of salts and boron. The varieties Valeria and Spotlight were grown in sand culture containing 11, 71, 131 and 191 m.e. salts/l. and containing 0·3, 2·3, 4·8 and 10·3 p.p.m. boron. The weight and length of spikes and the number of florets decreased markedly with an increased concentration of salts. Increasing B from 0 to 10 p.p.m did not have this effect but caused considerable leaf scorch at the higher concentrations The weight and size of corms and weight of cormels was reduced as the salt levels increased. The plants showed ability to absorb large quantities of Na and Cl, and K absorption was partially suppressed at the higher salt levels. Ca concentration within the plant only doubled with a 16-fold increased of Ca in the nutrient solution. Mg levels in the plant remained about the same in all treatments. B within the plant increased from 150 to 1,700 p.p.m. with a change from 0·3 to 10·3 p.p.m. B in the nutrient solution. [Authors' summary.]—Univ. Calif., Los Angeles.

3758. Hartsema, A. M., and Luyten, I.
Snelle bloei van iris Wedgwood. II. Invloed van temperatuur en licht. (**Forcing Wedgwood iris. II. The effect of temperature and light.**) [English summary 1½ pp.]
Reprinted from *Proc. kon. ned. Akad. Wetensch, Ser. C*, 1955, Vol. **58**, as *Meded. Lab. Plantenphysiol. Onderz. Wageningen* **134**, 1955, pp. 27, bibl. 9, illus.

Recommendations given previously [*H.A.*, 16: 393] are modified as a result of further trials. Very variable results were obtained when the period of pre-treatment at 31° C. was reduced from 3 weeks to 1 or 2 weeks. Increased flowering percentages were obtained by giving supplementary light. Flowering was accelerated by transfer to the greenhouse at 15° C. immediately after completion of flower formation at 13° C., and the flowering percentage was not affected. Curing at 9° C. caused some delay in flower formation. A week's pre-treatment at temperatures higher than 31° C. had a slightly detrimental effect on development and flower formation. Prolonged storage at room temperature (±20° C.) caused the flower initials to dry out. No flower initials were formed at 25½° C. The optimum temperature for flower formation was 13° C. Iris growth was affected by the duration and temperature of the curing treatment and also by greenhouse temperature. After curing for at least 9 weeks the flowers grew higher than the leaves. Curing at 13° C. gave better flowering percentages than at 9° C. Greenhouse temperatures higher than 15° C. were not satisfactory for forcing.

3759. Schread, J. C.
Iris borer and its control.
Circ. Conn. agric. Exp. Stat. **202**, 1957, pp. 7, bibl. 3, illus.

The biology of the iris borer, *Macronoctua onusta*, is described, and recommendations are made for its control by spraying at 7–10 day intervals from mid-April to late May with DDT emulsion and by one application in August of the phosphate insecticides Thimet and Trithion. Destruction of rubbish and old plant material in iris beds destroys overwintering eggs.

3760. Bald, J. G., and Chandler, P. A.
Reduction of the root rot complex on Croft lilies by fungicidal treatment and propagation from bulb scales.
Phytopathology, 1957, **47**: 285-91, bibl. 8, illus.

After the bulbs had been cured for a week at 35° C. and the roots removed, they were soaked in water for 2 days, treated with 1 : 200 commercial 40% formalin at 46° C. for 2 hr, and immersed for 24 hr. in PAS (5% tris(2-hydroxyethyl)-(phenylmercuri) ammonium acetate) diluted to 1 : 1,000. Scales were then removed and treated with ferbam before being placed in moist vermiculite at 21° C. to form bulbils. Some were also treated again with PAS before planting. This final treatment protected scale tissue from pathogens, but reduced bulbil production and induced temporary toxicity symptoms in plants from bulbils of the first 2 harvestings. From the 23 original bulbs 3,500 plants were produced, about 1,000 being unhealthy. In some instances *Fusarium oxysporum* f. *lilii* survived the fungicidal treatments and damaged new roots. Leaves immediately above diseased roots were frequently yellow or scorched or both. Pathogenic strains of *Pythium ultimum* and *Rhizoctonia solani* were also present. Field environment favoured *Pythium* and greenhouse conditions tended to favour *Fusarium*. A few completely disease-free bulbil plants were produced by prolonged washing in running water of scales of selected treated bulbs, surface-sterilizing the scales with a 1 : 12 dilution of 5% commercial sodium hypochlorite and then culturing on potato-dextrose agar for bulbil formation.—Univ. Calif., Los Angeles.

3761. Kalin, E. W.
Further studies on field cuttings and its influence on bulb production and forcing quality of King Alfred narcissus.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 508-10, bibl. 3.

Measured by bulb production and forcing quality, the early removal, in the field, of narcissus buds is not better than the generally recommended treatment of snapping of the flower heads at full bloom. [Author's conclusions.]—Wash. St. Coll., Pullman. [For earlier work see *H.A.*, 25: 843.]

3762. Woodville, H. C.
Costs of the cold dip for bulbs.
Grower, 1957, **47**: 1373-4.

Practical details and the advantages and disadvantages of the cold dip method and of hot water treatments plus insecticides for control of bulb fly on narcissus are discussed [see also *H.A.*, 27: 708]. Total costs of bulb dipping should not exceed £1 per ton of bulbs.

3763. MacArthur, M., and Chan, A. P.
Factors influencing the early blooming of William Pitt tulips.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 503-7, bibl. 10.

Flower abnormality, a degeneration to a "papery" texture, which occurred in early-forced William Pitt tulips, decreased with increase of flower bud development at the time the bulbs were stored at 48° F. Delaying cool storage until carpels were formed in the flower bud practically eliminated loss from this factor. Application of a rooting hormone at planting time to bulbs that has been stored at 48° F. when the flower meristem was forming sepals and petals did not result in earlier rooting but increased the number of saleable blooms. Increased weight of cut flowers and shortening of the harvest period were associated with more advanced bud development when the bulbs were stored at 48° F. Degeneration of the flower bud occurred late in plant development, i.e. just before, and frequently, after, the flower stem emerged from the encircling leaves. [From authors' abstract.]—Cent. exp. Fm, Ottawa.

3764. Zacharius, R. M., Cathey, H. M., and Steward, F. C.
Nitrogenous compounds and nitrogen metabolism in the Liliaceae. III. Changes in the soluble nitrogen compounds of the tulip and their relation to flower formation in the bulb.
Ann. Bot. Lond., 1957, **21**: 193-201, bibl. 11.

The nitrogen compounds of the tulip bulb at various stages of development were studied by methods based on paper partition chromatography. The principal free amino-acid of the vegetative bulb was found to be arginine; in the green leaf the amides glutamine and asparagine occurred, whereas free arginine was almost totally absent. The shift from arginine dominance to an increase in glutamine and asparagine was found to occur when the flower initials started to develop. Floral initiation and development did not appear to affect the content of γ-methyleneglutamic compounds. —Cornell Univ., Ithaca. [For part II see *H.A.*, 27: 2730.]

Lawns and sports turf.

(*See also* 3079, 3815s, t, z, 3816g, m.)

3765. Graham, M. D.
Turf in East Africa.
J. Sports Turf Res. Inst., 1956, **9**: 210-15, bibl. 1.

An account is given of the author's work in improving grass on golf courses in Kenya. This consisted of introducing the use of finer grasses, mainly local strains of *Cynodon dactylon*, and of working out a technique for preparing and establishing a green.

3766. (Lantz, H. L., Johnson, I. J., and Taylor, B.)
Your experiment station reports. Study turf grasses in hot, dry summer.
Ia Fm Sci., 1957, **11**(9): 24-5.

Kentucky 31 and Alta fescues remained green throughout the summer, whereas the growth of bluegrass and creeping red fescue ceased in late July. The best fertilizer treatment for turf grasses was the application of a 10–10–10 fertilizer in late May, but bent grass, kept closely cut, needed light applications, mainly of N, at 2- to 4-weeks intervals.

3767. Smith, J. D.
Seed dressing trials, 1956.
J. Sports Turf Res. Inst., 1956, **9**: 244-50, bibl. 1.

Earlier work had shown that Premasan (TMTD) at 1% gave increased establishment of N.Z. Chewing's fescue in uninoculated soil. In soil inoculated with *Fusarium culmorum* and in uninoculated soil a 2% dressing also resulted in increased establishment. The present work suggests that the 1% rate might be as effective in practice as the 2%. With Premasan and Fernasan (both containing TMTD) at 0·5% or 0·25%, Spergon at 0·5% and Agrosan at 0·05% some control was obtained of seedling disease of Chewing's fescue, particularly that due to *F. culmorum*. None of the seed dressings used significantly affected the germination of Chewing's fescue after storage for 10 months in screw-capped containers below 20° C.

3768. Beach, W. S.
Seed treatment of turfgrasses.
Proc. 23rd annu. Pa St. Turfgrass Conf., 1954, from abstr. in *J. Sports Turf Res. Inst.*, 1956, **9**: 273.

Seed treatment of Chewing's fescue and Kentucky bluegrass with various fungicides applied as dusts resulted in significant increases in seedling stand. The best and most constant increases were obtained with Arasan (TMTD) applied at 0·5% of seed weight. In steamed soil Arasan seed treatment also gave an appreciable increase in seedling stand. In soil infected with damping-off fungi the combination of a Tersan soil drench with Arasan seed treatment was 3 times as effective as seed treatment alone.

3769. Gould, C. J.
Turf diseases in western Washington.
Proc. N.W. Turf Conf., Pullman, Wash., 1956, from abstr. in *J. Sports Turf Res. Inst.*, 1956, **9**: 269.

The best materials for control of pink snow mould (*Fusarium nivale*) were Tersan, Calocure, Semesan and Mycostatin. PMA was the best of the materials tested against fairy rings (*Marasmius oreades*) but did not give complete control.

3770. Smith, J. D.
The use of griseofulvin against dollar spot and *Fusarium* patch diseases of turf.
J. Sports Turf Res. Inst., 1956, **9**: 203-8, bibl. 10.

Griseofulvin (liquid concentrate) was effective in reducing the amount of *Fusarium* patch (*F. nivale*) and dollar spot (*Sclerotinia homoeocarpa*) diseases which appeared in experiments, in which the diseases were started by inoculation and incubation under moist covers. In both cases increase in dosage of griseofulvin was reflected in a decrease in the amount of disease, the most effective dosage being 0·84 lb. per acre. In 2 experiments on bowling greens under practical conditions griseofulvin (w.p.) at 0·96 lb. per acre showed some protective activity against dollar spot but gave less effective control than mercury or cadmium fungicides. It is thought that the concentrate form of griseofulvin might be more effective than the wettable powder under field conditions.

3771. Smith, J. D.
Dollar spot trials, 1956.
J. Sports Turf Res. Inst., 1956, **9**: 235-43, illus.

Nitrogen and fungicide: Three applications of Antimucin WB/MG resulted in a 66% decrease in *Sclerotinia homoeocarpa* infection compared with an increase of 133% in the controls. The combination of the fungicide with 3 applications of sulphate of ammonia resulted in a further decrease in infection (98%). Treatment with sulphate of ammonia, however, made the turf more susceptible to new attacks of dollar spot the following year. *Cadmium fungicides:* Cadmium chloride or succinate gave good control of dollar spot and had a long protective action. *Cadmium and nitrogen:* The application of 2 or 4 oz. sulphate of ammonia per sq. yd. increased the effect of cadmium chloride. Nitrogen applications alone reduced but did not completely control the disease. [For earlier work see *H.A.*, 26: 3994.]

3772. Smith, J. D.
Fungi and turf diseases. 6. *Ophiobolus* patch disease.
J. Sports Turf Res. Inst., 1956, **9**: 180-202, bibl. 12, illus.

Since 1951 a patch disease caused by *Ophiobolus graminis* has frequently been noticed on *Agrostis* turf. Species severely affected are *A. tenuis*, *A. stolonifera* and, less frequently, *A. canina* and *Poa annua*. The disease is more prevalent in wet years and districts than in dry ones. Most of the severe cases of the disease have been seen on turfs with pH between 5·1 and 7·5. Application of lime to acid turf may result in development of the disease in severe form within 3 years. The application of sulphate of ammonia, mono-ammonium phosphate or an organic-mercury fungicide checked the disease and encouraged patch healing.

3773. Parris, G. K.
Screening Mississippi soils for plant parasitic nematodes.
Plant Dis. Reptr, 1957, **41**: 705-6, bibl. 1.

The cause of decline of turf grass, ornamentals, cotton and pecans in Mississippi was shown to be often due to attack by plant endo- and ectoparasitic nematodes, which are named. On lawns where nematodes could not be established as causal agents of decline, the applications of dieldrin (2–3 lb. of the technical product per acre) has given good recovery of the turf in several instances. There were no insect pests present and the action of the chemical remains unexplained.—Miss. St. Coll.

Succulents.

(*See also* 3816j.)

3774. Spear, I.
Some aspects of the physiology of succulence in *Kalanchoë blossfeldiana*.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xi-xii.

It is confirmed that succulence in *Kalanchoë* is increased by short-day treatment. It is concluded that increased succulence is not directly correlated with organic acid accumulation in the leaf.—Univ. Texas, Austin.

Roses.

(*See also* 3713, 3815g, 4012.)

3775. de Stigter, H. C. M.
De kieming van rozenonderstammenzaad. **(The germination of rose stock seeds.)** [English summary ¼ p.]
Meded. Dir. Tuinb., 1957, **20**: 356-62, bibl. 12.

Seeds of *Rosa* species and varieties were treated with concentrated sulphuric acid and subjected to varying periods of cold in an attempt to improve germination. Results varied widely from year to year, but 1 hour's treatment with sulphuric acid appeared to be beneficial. —Lab. Tuinbouwpl., Wageningen.

3776. Lundstad, A.
Forsøk med dyrking av roser. **(Cultural trials with roses.)**
Gartneryrket, 1957, **47**: 366-7, 369-70.

With 4 rose varieties on *Rosa multiflora* depth of planting (union 0–15 cm. below soil level) had no significant influence on number of flowers, number of root suckers or survival in winter.—Inst. Dendrol. Nursery Management, agric. Coll. Norway.

3777. Holley, W. D., and Galba, J.
Effects of fall pinching on Red Delight roses shown.
Colo. Flower Grs' Bull., No. 82 reprinted in *Flor. Exch.*, 1957, **128**(17): 48.

Unpinched plants produced more roses in August, September and October than plants pinched in the autumn. Pinched plants produced 18% more flowers from November 1st up to mid-June. More flowers were produced by unpinched plants, but, economically, returns from pinched plants were better. Glasshouse cooling by evaporative pads and exhaust fans increased head size in Pink Delight roses by about 50%, and foliage was larger and thicker than in roses ventilated by conventional methods.

3778. Lindstrom, R. S.
Developmental anatomy of the stem apex of the Better Times rose.
Diss. Abstr., 1956, **16**: 1987, being *Publ.* 18,807 of 56 pp.

In a microscopical examination of the terminal and axillary buds of Better Times roses in connection with the problem of blind wood [see also *H.A.*, 26: 4002], the following results were obtained: 1. The transition from the vegetative to the reproductive stage was considered to be the flattening of the apical meristem. 2. The first sign of abortion of the apex was disintegration of cells in the sepals or sepals and petals. 3. The next stage in the abortion of the bud was characterized by the appearance of necrotic bands in the sepals or sepals and petals. 4. The final stage was the appearance of an abscission layer in the stem below the pistil primordia. 5. Blind apices were found from the time of petal primordia up to and including pistil formation. —Ohio St. Univ.

3779. Ark, P. A., and Sibray, W. S.
Efforts to control crown gall of roses with antibiotics.
Plant Dis. Reptr, 1957, **41**: 449-51, bibl. 2.

Crown gall (*Agrobacterium tumefaciens*), entering through callus wounds, is apt to cause serious losses among rose cuttings planted in infested soil. Among varieties used in control experiments Paul's Scarlet was the most susceptible and Burr Multiflora the most resistant. With two varieties streptomycin dips at 500 and 600 p.p.m. and with one variety tetracycline at 100 p.p.m. gave some control. With the other varieties and with other treatments, which included streptomycin dusts at 1,000 and 2,000 p.p.m., the degree of control obtained was unsatisfactory.—Univ. Calif., Berkeley, and Calif. Dep. Agric., Oakland.

3780. McClellan, W. D., Taylor, F. A., and Smith, F. F.
Synergism between copper and sulfur in dust mixtures for the control of rose blackspot.
Phytopathology, 1957, **47**: 240-1, bibl. 6.

In trials with 2 varieties of rose on the control of black spot there was very little benefit from copper or sulphur dusts used alone. When copper and sulphur were combined in dust mixtures, however, black spot was markedly less severe on both varieties and flower yields were much greater than when either component was used alone.—U.S.D.A., Beltsville, Md.

3781. McClellan, W. D., Taylor, E. A., and Smith, F. F.
Relation of fungicide and miticide treatments to winter injury and spring blackspot development on roses.
Phytopathology, 1957, **47**: 357-60, bibl. 11.

In field trials of 29 fungicide-miticide dust combinations on 5 varieties of rose for the control of black spot and spider mites (*Tetranychus telarius*) a close correlation was observed between black spot control in one year and early flower production the following year. In general winter injury was greatest in plots that had had severe black spot the previous year. Greater differences in the amount of winter killing between treatments were shown by Golden Masterpiece (a variety easily defoliated by black spot) than by Red Radiance (tolerant to black spot). There were also indications that winter killing was less in plots where mite control had been good the previous year than where it had been poor.—U.S.D.A., Beltsville, Md.

3782. (Taylor, E. A., McClellan, W. D., and Smith, F. F.)
Effective control of spider mite on roses.
Amer. Rose Mag., summarized in *Flor. Exch.*, 1957, **128**(21): 39.

Combination sprays for simultaneous control of black spot and 2-spotted mites were tested on 3 rose varieties. Good control of black spot was obtained with copper-sulphur, ferbam, zineb and ferbam-sulphur, and of mites with Aramite, malathion and demeton. Copper-sulphur treatment caused injury.

3783. Kirby, R. S.
Systox-lead arsenate, antibiotics, and sulfur in the control of powdery mildew on roses.
Plant Dis. Reptr, 1957, **41**: 534-5.

Excellent control of *Sphaerotheca* sp. on roses was given by sprays of 12 oz. Systox+2 lb. lead arsenate in 100 gal. water, applied weekly from June to September. A sulphur-ferbam combination, griseofulvin and anisomycin were much less effective.—Pa St. Univ University Park.

3784. Karlin, E. J., Naegele, J. A., and Johnson, G. V.
Screening greenhouses with insecticide-impregnated cloth for thrips control.
J. econ. Ent., 1957, **50**: 55-8, bibl. 3.

As a method of controlling thrips, mainly *Frankliniella tritici*, greenhouses in commercial rose production were screened on the side or top and side vents with cheesecloth impregnated with emulsifiable dieldrin, heptachlor or malathion. Thrips were expected to penetrate such screens but die from contact residual action once inside the houses. Only dieldrin treated cheesecloth gave consistently significant control, and its use is recommended. Spraying the cloth with dieldrin during the thrips season may be advisable to maintain or improve control. Greenhouse temperatures were increased by approximately 10° F. as a result of screening without causing any noticeable reduction of flower quality.—Dep. Ent., Cornell Univ., and Ent. Res. Branch, U.S.D.A. [See also *H.A.*, 26: 4006.]

3785. Weinstein, L. H.
Fixation of $C^{14}O_2$ by cut Better Times roses during senescence.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xliv-xlv.

Better Times roses at different periods after cutting were allowed to absorb C^{14}-labelled sodium carbonate through the stems for 90 minutes in the dark. Amounts of C^{14} incorporated into the protein were very small, indicating that synthesis practically ceased after cutting. There was no measurable incorporation of C^{14} into glucose, mannose, xylose or ribose. It appears that a direct dark CO_2-fixation mechanism into malate occurs in cut roses, and that the rate of conversion from malate to citrate is slowed down with senescence.—Boyce Thompson Inst., N.Y.

3786. Luzina, L. V.
Results of variety trials on essential oil—bearing roses. [Russian.]
Kr. otčet, nauč.-issled. rab. 1954, Vses. n.-i. in-ta masilč. efiromaslič. kultur, Krasnodar, 1955, pp. 103-6, from abstr. in *Ref. Ž.* (*Biol.*), 1957, No. 6, Abstr. 22864.

Of 3 varieties in a 7-year trial the Krymskaja krasnaja rosa [Crimean red rose], a frost and rust resistant variety propagated by cuttings, was the most promising for the Krasnodar region, providing a consistent crop of petals and yield of oil.

3787. Hodyrev, G. A., and Čukomina, M. M.
Initial studies on the essential oil-bearing rose in the central chernozem belt. (Russian.]
Kr. otčet. nauč.-issled. rab. 1954, Vses. n.-i. in-ta maslič. efiromaslič. kultur, Krasnodar, 1955, pp. 107-8, from abstr. in *Ref. Ž.* (*Biol.*), 1957, No. 6, Abstr. 22865.

The first yield of a new plantation of the essential oil-bearing red rose planted at 2×1·5 m. was 38 centners per ha. of petals with an oil content of 0·15–0·22%.

Other trees and shrubs.

(*See also* 3042, 3081, 3271, 3815h, j, n, r, 3816c, e, f, h, o, r, t, 3859.)

3788. Boom, B. K.
Benaming, geschiedenis en kenmerken van een aantal houtachtige planten. (**Nomenclature, history and characteristics of some woody plants.**) [English summaries.]
Reprinted from *Jaarb. ned. dendrol. Ver. 1954–1955*, 1957, **20**: 37-124, illus., as *Meded. Inst. Vered. Tuinbouwgewass.* **97**.

This is the first of a series of contributions on cultivars of ornamental trees and shrubs important in the Netherlands, which are intended to supplement Rehder's "Manual of Cultivated Trees and Shrubs" and "Bibliography".

3789. Nordine, R. M.
Trimmed hedges.
Gdn J. N.Y. bot. Gdn, 1957, **7**: 92-4, illus.

A descriptive list of the 40 most successful hedge plants from the collection of 125 grown at the Morton Arboretum. Details are given of the height range, leaf colour and any special features of the plants.
J.R.L.

3790. Bates, C. G., and Stoeckeler, J. H.
Snowdrift control on highways by planting of trees and shrubs.
Contr. Lake States For. Exp. Stat., Minnesota, undated, pp. 17, bibl. 7, illus.

The planting of trees and shrubs is proposed for the prairies and plains of the northern United States as a possible substitute for the standard 4-foot snow fence. The action of wind as influenced by barriers is discussed. Profiles of snowdrifts formed by 18 belts of various ages, species, and numbers of rows show that a single row of low, dense shrubs is more effective in trapping snow in a limited zone near the belt than a 17-row belt of tall-growing trees devoid of limbs near the ground line. Planting of 2 to 4 rows are considered more satisfactory than single-row belts. A list of hardy trees and shrubs adapted to the rigorous climate of the Northern Great Plains is given in tabular form, with suggestions for several types of plantings. Recommendations on age class of trees and shrubs, ground preparation, planting, and care are given. [Authors' summary.]

3791. Palmer, J. G., Hacskaylo, E., and May, C.
Growth of tree seedlings not stimulated by application of streptomycin to their roots.
Comb. Proc. nat. Shade Tree Conf. 1956, pp. 65-74, bibl. 3, illus.

Applications of streptomycin sulphate to the substrate did not appear to stimulate seedling growth of American elm, red maple, sweet gum or Virginia pine.—George Washington Univ., Wash., D.C., and U.S.D.A., Beltsville, Md.

3792. Crum, P. F.
Chelated iron for the control of lime-induced chlorosis.
Comb. Proc. nat. Shade Tree Conf. 1956, pp. 229-31.

Soil injection with "Chelate 330" was given to several ornamental tree species showing symptoms of chlorosis. Mature leaves of magnolia did not respond, but new growth and immature foliage responded within 10 days. The other trees treated responded satisfactorily to treatment.—Div. Parks, Palo Alto, Calif. [For earlier work see *H.A.*, 25: 3155.]

3793. Ackerman, W. L.
After-ripening requirements for germination of seeds of *Acer truncatum* Bunge.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 570-3, bibl. 7.

Freshly harvested seeds of the Chinese maple, *A. truncatum*, germinated poorly. With seeds that were kept dry at 70° F. for periods of up to 4 months, stratification for 2 months in moist sand at 40° F. before sowing resulted in the best germination. When seeds were stored dry for 1 year or longer direct sowing without stratification gave the best results.—U.S.D.A., Chico, Calif.

794. Moretti, M. F. D.
Studies on the potato leafhopper, *Empoasca fabae*, as a nursery pest.
Diss. Abstr., 1956, **16**: 2263, being *Publ.* 18,480 of 227 pp.

Empoasca fabae is a serious pest of *Acer* and *Betula* species in New Jersey. Several contact insecticides gave satisfactory control. DDT emulsion had excellent initial and residual effects, prevented leafhopper injury and was non-phytotoxic. Three sprays of DDT during the season gave good results. Systox was the best of the systemic insecticides, but none of these gave control comparable to that obtained by the contact insecticides.—Rutgers Univ.

795. Walker, J.
Caragana is a valuable hedge and shelter-belt plant.
[*Publ.*] *Canada Dep. Agric.* 1957, pp. 8, illus.

Caragana arborescens, the Siberian peashrub, is a species widely used in western Canada, where is it hardy and adaptable to most soils that are not alkaline. An account is given here of its use, establishment and maintenance in field shelterbelts and hedges, together with information on the heading-back of overgrown hedges, the fuel value of caragana stems and the control of its commoner pests and diseases.—For. Nursery Stat., Indian Head, Sask.

796. Stalder, L., and Schütz, F.
Untersuchungen über die kausalen Zusammenhänge des Erikawurzelsterbens. (**Studies on the causal relationships or root decline in erica.**) [English summary 18 lines.]
Phytopath. Z., 1957, **30**: 117-48, bibl. 14, illus.

Root decline of *Erica gracilis* causes serious losses in Swiss nurseries. *Olpidium* and *Rhizophidium* spp., identified on diseased roots, were shown to attack only root systems previously weakened by excessive N applications. N increases the top : root ratio and prevents the development of mycorrhiza, which in their turn protect the roots against infection by parasitic fungi. On the other hand, plants receiving little N show deficiency symptoms and are unsaleable. Attempts to control *Olpidium* and *Rhizophidium* have so far been unsuccessful.—Eidg. Versuchsanst., Wädenswil.

797. Hess, C. E.
A physiological analysis of rooting in cuttings of juvenile and mature *Hedera helix* L.
Diss. Abstr., 1957, **17**: 940, being *Publ.* 21,085 of 157 pp.

Differences in rooting in mature and juvenile tissues of *Hedera helix* were studied. In long-day conditions auxin levels were increased and inhibitor levels decreased in both juvenile and mature tissues, but the rooting response of mature tissue was unaffected by photoperiod. In cuttings of both mature and juvenile tissue there was a marked increase in root number following application of synthetic auxin, but the increase was much less in mature than in juvenile tissue. Auxin extractions from juvenile and mature tissue showed no outstanding differences in types or amounts of auxins present. Substances inhibiting rooting of cuttings were found in both juvenile and mature tissues, but there was a greater proportion of inhibitors in juvenile tissue. By means of a mung bean bioassay it was possible to establish that the physiological difference in rooting response between juvenile and mature tissue was due to the present of a rooting co-factor in the juvenile form, which was absent in mature tissue.—Cornell Univ.

3798. Tachibana, Y., Sakazaki, N., and Ihara, Y.
Studies on *Hibiscus*. II. Self- and cross-compatibility and hybridization. I. [Japanese with English summary ⅓ p.]
J. hort. Ass. Japan, 1957, **25**: 255-60, bibl. 8.

H. syriacus was self-sterile, but its various races were cross-compatible. *H. coccineus* was about 50% fertile from self pollination or inter-racial pollination. Self-fertility was high in *H. mutabilis*, *H. hamabo*, *H. moscheutos*, *H. trionum* and *H. cannabinus*. From 30 different interspecific crosses only 3 produced fertile seed—i.e. *H. mutabilis* × *H. moscheutos*, *H. coccineus* × *H. moscheutos* and the reciprocal *H. moscheutos* × *H. coccineus*. Empty capsules were produced by *H. hamabo* when cross pollinated.

3799. Kofranek, A. M., and Leiser, A. T.
Defoliation of hydrangea.
Calif. Agric., 1957, **11**(8): 12, 15.

As a prelude to the cold storage of hydrangea plants before forcing almost complete defoliation, without injury to flower buds, was obtained with Vapam (sodium methyl dithiocarbamate), at dilutions of 2·5 ml./l. and over, applied to the soil at ½ pt./sq. ft., and with sprays of Folex (tributyl phosphorotrithioate) at 10 ml./l. and over. A 4% zinc chloride spray gave 76% defoliation compared with 7% in untreated control plants.—Univ. Calif., Los Angeles.

3800. Asen, S., Siegelman, H. W., and Stuart, N. W.
Anthocyanin and other phenolic compounds in red and blue sepals of *Hydrangea macrophylla* var. Merveille.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 561-9, bibl. 95, illus.

The anthocyanin and certain other phenolic compounds, determined by paper chromatographic and spectrophotometric methods, were found to be identical in the red and blue sepals of Merveille hydrangeas. The factors that may affect the colour of hydrangea sepals are discussed.—U.S.D.A., Beltsville, Md.

3801. Neiswander, R. B.
Control of mites on evergreens.
Amer. Nurserym., 1957, **105**(12): 14.

Hillbush juniper trees were sprayed in May with 15 acaricide materials for the control of spruce red spider [*Paratetranychus ununguis*]. Significant differences in effectiveness of the materials became apparent 120 days after treatment. Outstanding mite control was obtained with Kelthane, Trithion and Actaphene. A second application was made in September and the same 3 materials again gave the best results.

3802. Griesel, W. O., and Biale, J. B.
Respiratory trend in perianth segment of *Magnolia grandiflora*.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xliv.

Respiration rapidly increased during the period of flower expansion and opening, reaching a maximum during the first 2 days of flowering and then decreasing until death, which usually occurred 1–2 days after abscission.—Los Angeles St. Coll., and Univ. Calif., Los Angeles.

3803. Munnecke, D. E., and Chandler, P. A.
A leaf spot of *Philodendron* related to stomatal exudation and to temperature.
Phytopathology, 1957, **47**, 299-303, bibl. 3, illus.

Plants of *Philodendron* "*hastatum*" subjected to high air or soil temperatures (60°–80° F.) developed exuding and sometimes necrotic spots on the lower surface of leaves, the exudate being colonized by sooty moulds. The disorder was attributed to a physiological disturbance as fungicides gave no control and neither air pollution nor nutrition appeared to influence it.—Univ. Calif., Los Angeles.

3804. Beck, G. E.
Photoperiod induced branching of poinsettia (*Euphorbia pulcherrima* Wild.).
Diss. Abstr., 1956, **16**: 1762, being *Publ.* 18,373 of 112 pp.

Branching in poinsettia was induced by application of short-day treatment to start floral initiation followed by long-day treatment. The treatments must be given to the stock plant before the cuttings are taken for the effect to be of commercial value. Stock plants from which a relatively small amount of shoot apex had been removed produced more cuttings and were more receptive to the inductive dark periods than plants with more than the stem apex removed. Shoot development on the latter was more rapid, however, so that cuttings could be taken sooner. Cuttings produced from soft-pinched stock plants, given 34 inductive dark periods (16 hours) from the day of pinching or up to 12 days before, produced plants for the Christmas crop of which 50% or more had photoperiod-induced branching.—Univ. Wisconsin.

3805. Gartner, J. B., and McIntyre, M. L.
Effect of day length and temperature on time of flowering of *Euphorbia pulcherrima* (poinsettia).
Proc. Amer. Soc. hort. Sci., 1957, **69**: 492-7, bibl. 8, illus.

In North Carolina growers have experienced difficulty in preventing poinsettias flowering too early for the Christmas market. Reducing night temperatures to 54–55° F. to hold the plants back is apt to result in the development of root rots. Experiments reported here have shown that flower initiation occurs between Sept. 15 and 25, and that, if supplementary light is supplied to extend the photoperiod to 14 hours from Sept. 15 until the early part of October, flowering can be effectively delayed. The duration of long-day treatment should be governed by temperature. At temperatures below 60° F. the termination of long photoperiods on Oct. 8 was satisfactory, but at temperatures above 60° F. it proved desirable to extend them until Oct. 12. To avoid root rot it was necessary to keep temperatures above 60° F. The treated plants showed better keeping quality than plants grown without supplementary light.—N.C. St. Coll., Raleigh.

3806. Link, C. B., and Shanks, J. B.
The mineral nutrition of poinsettia stock plants in the greenhouse.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 502-12, bibl. 7.

Earlier work [*H.A.*, 23: 1084] showed that the nutrition of poinsettia stock plants affected not only the number of cuttings that could be obtained, but the ability of the cuttings to root and their subsequent growth during forcing. The studies reported here show that the varieties Ruth Ecke and Barbara Ecke Supreme differ in their fertilizer requirements. In general, a 25–10–10 fertilizer gave good results with both varieties. A relationship was found to exist between P and Mg, which, however, varied with the variety. In the case of Ruth Ecke the addition of Mg to the fertilizer mixture might be beneficial.—Univ. Md, College Park.

3807. Shanks, J. B., and Link, C. B.
The mineral nutrition of poinsettias for greenhouse forcing.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 513-22, bibl. 5.

These studies were concerned with the fertilization of poinsettias being forced in the greenhouse for sale as flowering potted plants. Chemical analysis of the leaves and the growth response of the plant were used to indicate the results and effectiveness of the treatments applied. Relatively high rates of nitrogen application were beneficial, resulting in earlier flowering, larger flowers, longer stems, more flowering stems per plant, and in growth conditions conducive to alleviation of deficiency symptoms, particularly those of a lack of magnesium. The application of some phosphorus and potassium was desirable and the amounts supplied by a 25–10–10 fertilizer (2½–1–1 ratio) were found to be desirable or adequate. [Authors' summary.]—Univ. Md, College Park.

3808. Kofranek, A. M., Lunt, O. R., and Kohl, H. C.
Tolerance of poinsettias to saline conditions and high boron concentrations.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 551-5, bibl. 6.

Poinsettia pot plants are relatively sensitive to moderately high saline or boron levels. Plants grown above 135 m.e. salts abscissed a majority of their leaves. Plant height and bract diameter were seriously reduced above this level. Ion uptake and accumulation by the plants at 4 salinity levels are discussed. Boron at levels above 4·8 p.p.m. causes interveinal leaf chlorosis, and marginal scorch which is followed by leaf abscission. High B levels have less effect on plant size than do high salinity levels. B accumulates mainly in the lower leaves, which show symptoms of necrosis. [Authors' summary.]—Univ. Calif., Los Angeles.

3809. Sleeth, B.
Black root rot of pothos (ivy).
J. Rio Grande Valley hort. Soc., 1957, **11**: 93-4, bibl. 1.

Pothos, *Scindapsus aureus*, grown as a pot plant, 3 plants a 3-in. clay pot, frequently suffers from a black ot rot disease, even when the potting soil is steam erilized. An attempt to reduce root rot with various nounts of sulphur and ammonium phosphate was nsuccessful. In further trials with different potting edia two materials, cotton gin trash and wood avings, proved effective in reducing root rot and creasing the percentage of marketable plants. These sults and other observations suggest that the primary use of root rot is waterlogging. Possible means of proving drainage and aeration are discussed.—Tex. gric. Exp. Stat., Weslaco.

10. Ticknor, R. L., and Bobula, P. F.
A comparison of rhododendron wounding techniques.
Amer. Nurserym., 1957, **105**(10): 9-10, bibl. 5, illus.

ounding cuttings of *Rhododendron catawbiense* oseum Elegans increased the percentage rooting and e size of the root systems. The degree of rooting peared to be directly related to the severity of ounding. Of 5 methods of wounding tested, the best sults were obtained by stripping (bark removed from e basal inch of the cutting) and by wounding one or th sides (a thin slice of bark removed from the al 1½ in.). Slitting or slicing the bark was less fective. Wounding one or both sides was much icker than stripping.—Univ. Mass., Waltham.

1. Colgrove, M. S., Jr., and Roberts, A. N.
Growth of the azalea as influenced by ammonium and nitrate nitrogen.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 522-36, bibl. 22, illus.

nd culture experiments were conducted to determine nditions which promote good growth and foliage lour in the azalea variety Hexe (*Rhododendron tusum*), when supplied with either NH_4-N or NO_3-N. H_4-N supplied as sulphate or hydroxide, produced ter growth and leaf colour and was required in naller amounts than NO_3-N. The standard NO_3-N ution used resulted in poor growth and chlorosis. rowth and colour, however, were improved when rge amounts of H and SO_4 ions were added to the lution or when the total base content was reduced a low level. Large additions of Cl and H ions evented chlorosis, but did not improve N nutrition. educing the NO_3-N concentration reduced growth it chlorosis did not develop. Chlorosis was closely sociated with high pH of the leaf tissue. Solution justments which promoted good growth with NO_3-N wered tissue pH, but such adjustments had little fect on growth during periods of high light intensity d/or long days. It is concluded that the ammonium n reduces the uptake of other cations and thereby duces plant tissue pH. Nitrate apparently increases se absorption and Fe is inactivated in the plant sue as a result of the higher tissue pH. [From thors' summary.]—Ore. St. Coll., Corvallis.

12. Lunt, O. R., Kohl, H. C., and Kofranek, A. M.
The effect of bicarbonate and other constituents of irrigation water on the growth of azaleas.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 537-44, bibl. 12.

Azaleas grown in peat were found to be sensitive to nutritional unbalance and to solutions containing about 50 m.e. of salts per litre. Of the ions Ca, Na, Mg, SO_4, Cl and HCO_3 studied relatively large amounts of HCO_3 alone had any serious adverse effect on growth. Water with a high bicarbonate content markedly increased Na absorption when Ca supplies were low, decreased the absorption of Ca and Fe and accentuated Ca deficiency. The CO_2-HCO_3-pH relationships are discussed and it is pointed out that the effects attributed to HCO_3 might be due to HCO_3, H_2CO_3 or CO_2 in the soil atmosphere or to pH relationships.—Univ. Calif., Los Angeles.

3813. Lunt, O. R., Kohl, H. C., Jr., and Kofranek, A. M.
Tolerance of azaleas and gardenias to salinity conditions and boron.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 543-8, bibl. 9.

Two azalea varieties and a gardenia variety were very sensitive to treatment with sodium and calcium chloride, growth being reduced by 50% or more by a total concentration of about 50 m.e. of salts in the solution applied to the rooting medium. The azalea Mrs. Fred Saunders failed to survive at this concentration. The azalea Sweetheart Supreme and the gardenia Belmont were both sensitive to high levels of B, although the latter responded positively at moderately low levels. The azalea variety Mrs. Fred Saunders was slightly more tolerant to B. This may be related to the fact that it was less effective in absorbing B than the variety Sweetheart. The implications of analyses of the tissues are discussed. [From authors' summary.]—Univ. Calif., Los Angeles.

3814. Downs, R. J., and Borthwick, H. A.
Effect of photoperiod upon the vegetative growth of *Weigela florida* var. *variegata*.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 518-21, bibl. 9, illus.

Rooted cuttings of *Weigela* in short (8- and 10-hour) photoperiods stopped stem elongation and produced large terminal and conspicuous axillary buds. The inhibitory effect of short photoperiods, however, quickly disappeared when plants were changed to longer (14- and 16-hour) photoperiods, and the buds resumed growth. It is suggested that by regulating day-length the amount of growth suitable for providing cuttings might be increased, and also plants might be induced to produce such growth at seasons when propagation by cuttings is desirable but no cutting material is normally available.—U.S. Dep. Agric., Beltsville, Md.

Noted.

3815.
a Amici Fabricatore, J.
Le malattie delle piante ornamentali osservate in Italia. Dicotyledoneae. Parte I e II. **(Diseases of ornamental plants in Italy. Dicotyledons.)**
Ann. Sper. agrar. 1957, **11**(2), Suppl. pp. xlv-lxxviii, and **11**(3), Suppl. pp. lxvii-ciii, bibls.
Bibliographical notes.

b ANDERSON, A. W.
Salvias I have grown.
N.Z. Plants Gdns, 1957, **2**: 80-4.
Including a descriptive list of 37 species and varieties.

c ANON.
New machinery.
J. Sports Turf Res. Inst., 1956, **9**: 251-3, illus.
For raking and mowing turf and shredding soil.

d BERNINGER, L. M., AND BECK, G. E.
Enjoy dahlias.
Circ. Wis. agric. Ext. Serv. **544**, 1957, pp. 8, illus.
Propagation, culture, fertilizers, tuber harvesting and storage, and disease and pest control.

e BOOTH, V. H.
β-Carotene in the flowers of *Narcissus.*
Biochem. J., 1957, **65**: 660-3, bibl. 9.
The main pigment in the red coronas.

f BRIERLEY, P., AND LORENTZ, P.
Wisteria mosaic and peony leaf curl, two diseases of ornamental plants caused by viruses transmissible by grafting but not by sap inoculation.
Plant Dis. Reptr, 1957, **41**: 691-3, bibl. 5, illus.
Symptoms of minor diseases.

g CALMEJANE, F.
La protection sanitaire des rosiers. **(Protection of roses from pests and diseases.)**
Jardins Fr., 1957, **3**: 97-101, illus.
Notes on symptoms and treatments.

h CANNON, T. F.
Foliar analysis as an index to the fertilizer requirements of some ornamental trees.
Comb. Proc. nat. Shade Tree Conf. 1956, pp. 84-93.

i CAROLIN, R. C.
Cytological and hybridization studies in the genus *Dianthus.*
New Phytol., 1957, **56**: 81-97, bibl. 19, illus.
As a basis for revised taxonomy.

j CARRA, P., THÉAU, A., AND BENAZOUZ, O.
Shrubs d'Algérie. **(Shrubs of Algeria.)**
Rev. hort. Algér., 1957, **61**: 21-37, 80-93, illus.

k CLORE, W. J.
Hardy early-blooming chrysanthemums for irrigated Central Washington.
Stats Circ. Wash. St. agric. Exp. Stats **87**, revised 1957, pp. 10, illus.
Including brief variety descriptions and notes on culture.

l CORNILLIE, E.
La rose trémière. **(The hollyhock.)**
Bull. hort. Liège, 1957, **12**: 232, 243, illus.
Origin and early history.

m CORTE, A.
Una nuova virosi del *Pittosporum.* **(A new virus of *Pittosporum.*)** [English summary 6 lines.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 197-202, bibl. 3, illus.
Symptoms of a disease, transmissible by grafting.

n (FISHER, H. H.)
Holly with a future.
Agric. Res. Wash., 1957, **5**(11): 13, illus.
Notes on *Ilex cornuta* var. Rotunda.

o FORSYTH, W. G. C., AND SIMMONDS, N. W.
Anthocyanidins of *Lochnera rosea.*
Nature, 1957, **180**: 247, bibl. 4.
Hirsutidin, petunidin and malvidin.

p GAGNOTTO, A. V.
Le malattie delle piante ornamentali osservate in Italia. Parte I. Pteridophyta e gymnospermae. II. Angiospermae Monocotyledoneae. **(Diseases of ornamental plants in Italy. I. Pteridophytes and Gymosperms. II. Angiosperms-Monocotyledons.)**
Ann. Sper. agrar. 1957, **11**(2), Suppl. pp. I-XLIV and **11**(3), Suppl. pp. I-LXVI, bibls.
Bibliographical notes.

q GILMOUR, J. S. L., AND YOUNGER, R. W.
The national species collection of tulips at Cambridge.
J. roy. hort. Soc., 1957, **82**: 242-7.

r HADLAND, K.
Shade tree problems of the arid south-west.
Comb. Proc. nat. Shade Tree Conf. 1956, pp. 269-73.
Including list of species.

s HAES, E. C. M.
Annual meadow-grass in turf—an appraisal.
J. Sports Turf Res. Inst., 1956, **9**: 216-18, illus.

t HARRIS, J. H., AND CHAMBLEE, D. S.
Carolina lawns.
Ext. Circ. N.C. agric. Ext. Serv. **292**, revised 1957, pp. 15, illus.
Warm and cool season grasses, establishment and maintenance.

u VAN DEN HENDE, R.
Quelques additions à la flore dendrologique de nos jardins. **(Some additions to our garden trees and shrubs.)**
Rev. d'Oka, 1957, **31**: 57-62, bibl. 4.
Suitable species for the Montreal area.

v HOOD, J. R., AND STEWART, R. N.
Factors affecting symptom expression in *Fusarium* wilt of *Dianthus.*
Phytopathology, 1957, **47**: 173-8, bibl. 7, illus.
To test carnations for susceptibility the best temperatures are: soil 26° C., air 21°–26° C.

w JUNGES, W.
Beziehungen zwischen der photoperiodischen Angepasstheit der Pflanzen und der geographischen Breite ihrer Heimat. **(The relation between photoperiodic adaptation of plants and the geographic latitude of their origin.)**
Planta, 1957, **49**: 11-32, bibl. 29.
A physiological and ecological study of 14 ornamental species.

x JUNGFER, E.
Über einige weitere Blütenfarbfaktoren bei *Matthiola incana*. **(On some further flower colour factors in *Matthiola incana*.)**
Züchter, 1957, **27**: 140-5, bibl. 9.
Genetics of flower colour.

y KERR, S. H.
Plant injury by pesticide sprays.
Sunshine St. agric. Res. Rep., 1957, **2**(1): 4-5.
See *H.A.*, 27: 2681.

z LANTZ, H. L.
Good lawns are made.
Ia Fm Sci., 1957, **11**(10): 11-14, illus.
Hints on preparation, sowing and maintenance.

16.
a MACKIEWICZ, —.
La préparation des anémones sur la Côte d'Azur. **(The preparation of anemones on the Riviera.)**
Rev. hort. Paris, 1957, **129**: 1640-3, illus.
Temperature treatments for forcing.

b (MILLER, H. N.)
Antibiotics stop plant diseases.
Sunshine St. agric. Res. Rep., 1957, **2**(1): 13.
Bacterial root of philodendrons controlled by Agrimycin 100 at 200 p.p.m. every 4 days.

c OLIVER, R. W.
Culture of ornamental trees for Canadian gardens.
Publ. Canada Dep. Agric. **994**, 1957, pp. 30, illus.
Uses, propagation, planting and care.

d OLIVER, R. W.
Flowering bulbs for Canadian gardens.
Publ. Canada Dep. Agric. **996**, 1957, pp. 30, illus.
Tender and hardy bulbs, corms and tubers.

e OLIVER, R. W.
Trees for ornamental planting.
Publ. Canada Dep. Agric. **995**, 1957, pp. 28, illus.
Brief descriptive notes on deciduous and coniferous trees.

f PLUMRIDGE, A. J.
Seed propagation of exotic shrubs and trees.
J. Agric. Vict., 1957, **55**: 391-5, illus.
Hints on raising seedlings of 17 genera.

g ROOME, B. W.
Grass cutting—some of the problems which arise.
J. Sports Turf Res. Inst., 1956, **9**: 221-4.
With notes on machinery and the time taken to cut various areas of sports turf.

h RÜNGER, W.
Tageslänge und Temperatur bestimmen Wachstum und Blütenbildung. **(Day length and temperature determine growth and flower formation [in *Euphorbia splendens*].)**
Gartenwelt, 1957, **57**: 178-9, bibl. 1, illus.
Practical application of work described in *H.A.*, 27: 2734.

i SCHWANITZ, F.
Zur Genetik der Blütenfärbung bei *Digitalis purpurea*. **(The genetics of flower colour in *Digitalis purpurea*.)**
Züchter, 1957, **27**: 150, bibl. 3.

j SCHWANTES, G.
The cultivation of the mesembryanthemaceae.
Issued as supplement to *Cactus Succ. J., G.B.*, 1952/53, pp. 36, bibl. numerous, illus.

k SEIFRIED, G.
Eine Pikiermaschine für Farne. **(A pricking-out machine for ferns.)**
Gartenwelt, 1957, **57**: 209-10, illus.

l SIEBER, J.
Wie nehmen Bromeliaceen ihre Nährstoffe auf? **(How do bromeliads absorb nutrients?)**
Gartenwelt, 1957, **57**: 145-7, 164-6, bibl. 12, illus.
See *H.A.*, 26: 2022.

m SIMPSON, G.
Some notes on sports ground maintenance.
J. Sports Turf Res. Inst., 1956, **9**: 228-30.

n STOREY, W. B.
Diploid and polyploid gamete formation in orchids.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 491-502, bibl. 17

o THOMAS, G. S.
Bamboos.
J. roy. hort. Soc., 1957, **82**: 247-55.
Notes on species, cultivation as garden plants and flowering.

p TURMEL, J.-M.
Dégats et pertes dus au froid dans les collections horticoles pendant le mois de février 1956. **(Damage and losses due to cold in horticultural collections during February, 1956.)**
Ann. Soc. nat. Hort. Paris, 1957, **3**(9): 244-70, bibl. 30.
Behaviour of numerous ornamental species recorded.

q VIACAVA, L.
Caladium: interessante coltivazione da serra calda. **(Caladium: an interesting hothouse plant.)**
Frutticoltura, 1957, **19**: 263-9, illus.
Varieties, cultivation and disease control.

r WYMAN, D.
Hedges for North America.
Nat. hort. Mag., 1957, **36**: 204-17, illus.
A revision of earlier article [*H.A.*, 18: 574].

s YEATES, J. S. ,
Lilies.
N.Z. Plants Gdns, 1957, **2**: 57-64, illus.
Including notes on some *auratum* × *speciosum* hybrids bred by the author.

t ZWINTZSCHER, M.
Bericht über eine abweichende Fruchtform bei der Scheinquitte *Chaenomeles japonica* (Thunb.) Lindl. **(Report on an abnormal fruit shape in the Japanese quince, *Chaenomeles japonica*.**
Gartenbauwiss., 1956, **21**: 407-15, bibl. 7, illus.

SUB-TROPICAL FRUIT AND PLANTATION CROPS.

General

See 3089x, 3892u, 3893k.

Avocadoes.

(*See also* 3832, 3892i, j, y, 3893a, c.)

3817. COOPER, W. C., AND OTHERS.
Salt-tolerance and cold-hardiness tests on avocado trees.
J. Rio Grande Valley hort. Soc., 1957, **11**: 67-74, bibl. 6, illus.

The Lula variety, 2 selections of the Mexican race, and 3 selections of Mexican-West Indian hybrids were tested for salt tolerance and cold hardiness by artificial tests under controlled conditions. The salt-tolerance and cold-hardiness ratings obtained agree with those obtained by field-survival observations. The Lula variety showed a high salt-tolerance rating but a low cold-hardiness rating. The Mexican selections, on the other hand, showed a low salt-tolerance rating and a high cold-hardiness rating. A Mexican-West Indian hybrid, Aesola 1-18, had the best combined salt-tolerance cold-hardiness ratings. [Authors' summary.]—U.S.D.A. and Tex. agric. Exp. Stat., Weslaco, etc.

3818. BÁEZ, J. R., AND TOSCANI, H. L.
Paltas de buen comportamienti al frío. **(Cold resistant avocado varieties.)**
Idia, 1956, Nos. 106/8, pp. 204-5.

In the Cordoba province of Argentina the varieties Ganter, Blake, Blackbird and Northrop were resistant to frost. The characteristics of their fruits are described. The last named variety was also drought resistant.

3819. GUSTAFSON, C. D.
Irrigate avocado frequently.
Calif. Citrogr, 1957, **42**: 291-3.
Frequent irrigation of avocado trees important.
Citrus Leaves, 1957, **37**(8): 10-11.

Some growers in San Diego County, Calif., have succeeded in reducing tipburn on avocado leaves by adopting a programme of frequent light irrigations (as often as once a week in peak periods) combined with a heavy irrigation every 5 to 8 weeks to leach out accumulated salts.

3820. SCHROEDER, C. A., AND WIELAND, P. A.
Diurnal fluctuation in size in various parts of the avocado tree and fruit.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 253-8, bibl. 6.

Although nearly mature avocado fruits showed a consistent increase in size from day to day, marked fluctuations were found to occur within each day. Maximum fruit size, which was reflected in fruit weight, was attained early in the morning. Thereafter, as transpiration increased with increases in light and temperature, an internal moisture stress developed, and water moved from the fruit to the leaves causing the fruit to decline in size until the mid-afternoon. Partially developed fruits showed proportionately larger diurnal variations than mature fruits, but the variations in the latter were sufficiently large to suggest that the time of day at which a crop is harvested is a matter of practical significance. Similar daily fluctuations in size were found to occur in trunks, branches and roots. —Univ. Calif., Los Angeles.

3821. HATTON, T. T., JR., SOULE, M. J., JR., AND POPENOE, J.
Effect of fruit position and weight on percentage of oil in Lula avocados in Florida.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 217-20, bibl. 6.

The correlation between weight and percentage of oil in Lula avocado fruit was determined. Variations in fruit on different trees within groves and variations in position on trees were studied. There were differences in percentage of oil in fruit between trees and these differences remained after covariance adjustment for weight were made. A low correlation between weight and percentage of oil indicated that Lula fruit cannot be selected by weight alone during midseason for a specific percentage of oil. Fruit from the top halves of the trees had higher percentages of oil than did those from the bottom halves. There was little difference in percentage of oil in fruit selected from different compass directions on the tree. [Authors' summary.]—U.S. Dep. Agric., Homestead and Orlando, Fla.

3822. NEWSOM, D. W.
Preliminary studies on low temperature ripening of avocados for control of anthracnose.
J. Rio Grande Valley hort. Soc., 1957, **11**: 81.

In preliminary tests Mexican-type avocadoes held at 55°–60° F. kept for up to 4 weeks with negligible development of anthracnose [*Colletotrichum gloeosporioides*?], whereas fruit ripened at 80° F. commonly showed 100% infection after 3–4 days. Several fungicidal dips [not specified] proved ineffective against anthracnose.—U.S.D.A., Harlingen, Tex.

Citrus—general.

See 3892a, e-g, m, 3893f, 4020.

Citrus—varieties, propagation and rootstocks.

(*See also* 3892n, 3893h.)

23. Ford, H. W.
A method of propagating citrus rootstock clones by leaf bud cuttings.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 204-7, bibl. 13.

rapid technique for securing a large number of rootock progeny from a limited source of parent material described. Roots of the desired tree [rough lemon, weet orange and sour orange] were severed and the t ends lifted above the soil surface. The sprouts that ere produced on the roots were cut into leaf bud ttings. The most economical method for large scale ropagation made use of ground beds with a translucent over, a mixture of German peat and perlite as the oting medium, and constant or intermittent mist uring daylight only. It was found that rooting ercentage could be increased by using bottom heat t for a minimum of 90° F. The physiological age of e cutting material was an important factor in securing gh rooting percentages within a reasonable period of me. [Author's summary.]—Citrus Exp. Stat., Lake fred, Fla.

24. Rodriguez, O., and Inforzato, R.
Enraizamento de estacas da variedade corsa de cidra (*Citrus medica*, L.). **(Rooting of Corsican citron (*Citrus medica*) cuttings.)** [English summary 7 lines.]
Bragantia, 1956, **15** (Suppl.): xix-xx, bibl. 1, illus.

he bases of citron cuttings were immersed for 24 hr. solutions of growth substances and planted in sand a greenhouse. The best results were given by β-dolebutyric acid at 10^{-3} Good rooting was achieved ith β-indoleacetic acid at the same concentration. ut α-naphthaleneacetic acid at 10^{-3} was less effective nd maleic hydrazide at 10^{-6} gave results inferior to ose obtained with untreated cuttings.

325. Beñatena, H. N.
Plantas madres de mandarino buenas productores. **(High yielding mandarins as sources of budwood.)**
Idia, 1956, Nos. 106/8, pp. 169-70.

he average yield of mandarins in full production, rafted on sweet orange, is 1,400 fruits per tree in oncordia, Argentina, but by carefully selecting budood from high-yielding strains certain trees have roduced an average of 3,000 fruits per tree over a 0-year period.

326. Marloth, R. H.
Rootstocks for Jaffa and Joppa oranges.
J. hort. Sci., 1957, **32**: 162-71, bibl. 8, illus.

he midseason Jaffa-Joppa type orange varieties hamouti and Tomango have been grown on several otstocks for 20 years. The incidence and effects of ncompatibility due to the presence of xyloporosis are escribed and discussed. The sweet orange has proved e most suitable rootstock but Empress mandarin is lso regarded as promising. Trees budded to rough mon all showed a marked corky girdling effect, condered to be associated with xyloporosis of the scion arieties at the union. Yields on these trees were good for the first 15 years of life, but fruit quality was poor.—Citrus subtrop. hort. Res. Stat., Nelspruit, S.A.

3827. Arroyo, J. E., and others.
Estación Experimental de Bella Vista. **(The Bella Vista Experiment Station.)**
Idia, 1956, Nos. 106/8, pp. 95-7.

Productivity of sweet oranges and mandarins on the following rootstocks decreased in the order: Rangpur lime, sweet orange, Cleopatra mandarin, Persian lime. No success was achieved with Dr. Caire grapefruit, sour orange or trifoliate orange as rootstocks, except with scions of Parson Brown and Washington Navel on the last named. The best rootstock economically was Cleopatra, which was unaffected by Zn deficiency. The variety with the highest production was Parson Brown. In a 6-year manurial trial with sweet orange on Persian lime and sweet orange rootstocks, organic manures produced better growth and cropping than a treatment combining NPK, nutrient sprays and mulching.

3828. Galván, A. C. A.
Combinaciones cítricas para la región. **(Citrus combinations for the [Formosa] district of Argentina.)**
Idia, 1956, Nos. 106/8, p. 110.

A brief note states that Marsh Seedless grapefruit showed better growth but produced less juicy fruit on sweet orange than on Rangpur lime. Villafranca lemon gave higher yields on rough lemon than on Rangpur lime, but juicier fruit on the latter. Concordia mandarin yielded well on trifoliate orange, but produced juicier fruit on Cleopatra mandarin. The mandarin Improved produced good yield and quality on Rangpur lime. The B. Calderón orange was very successful on either rough lemon or sweet lime, but for Lue Gim Gong rough lemon was the more compatible and Rangpur lime gave juicier fruit.

3829. Banfi, A.
El pie trifolio. **(Trifoliate orange as rootstock.)**
Idia, 1956, Nos. 106/8, pp. 170-1, illus.

The spread of exocortis and the dwarfing effect induced by trifoliate orange rootstocks have been substantially reduced by selecting budwood from scions 10-12 years old, established on disease-free trifoliate stocks. Budding is carried out low on the rootstock and the union is covered with soil at transplanting, giving rise to a broad-based conical trunk instead of the narrow cylinder characteristic of high worked trifoliatas. [See also *H.A.*, 27: 1804.]

Citrus—climatic factors.

3830. Koo, R. C. J.
Weather conditions, irrigation practices, and Valencia orange production.
Citrus Mag., 1957, **19**(11): 8-10, 16-17, bibl. 4.

A survey of 150 mature Valencia orange groves on rough lemon rootstocks showed that N was the dominant element influencing yield, but that, regardless of the amount of N used, yields were depressed whenever soil moisture was deficient. Over a 3-year period a relationship existed between annual rainfall and average yield per tree. Comparisons between irrigated and non-irrigated groves revealed the benefit of irrigation in areas which had rainfall deficits exceeding 6·5 in. from February to June inclusive. The use of evapotranspiration data shows promise as a means of determining irrigation needs.—Fla Citrus Exp. Stat., Lake Alfred.

3831. Olson, E. O., and Cooper, W. C.
Mesophyll collapse and defoliation of grapefruit leaves following cold dry north winds in the Rio Grande Valley of Texas.
J. Rio Grande Valley hort. Soc., 1957, **11**: 34-43, bibl. 13, illus.

Three different periods of cold dry north winds occurred in the Lower Rio Grande Valley of Texas in November 1956 [lowest temperature recorded 38° F., lowest relative humidity 8%, and highest wind velocity 37 m.p.h., the last two occurring on the same day]. By December, partial defoliation of branches and mesophyll collapse were common in the tops and north sides of grapefruit and sweet orange trees in commercial groves. In experimental plantings, young grapefruit trees on rough lemon and some mandarin rootstocks showed less damage than those on Cleopatra mandarin, sour orange and other test rootstocks. Young grapefruit trees on Cleopatra mandarin and sour orange rootstocks showed more defoliation and mesophyll collapse on dry soils than on wet ones. Local growers consider that cold dry north winds cause collapse in susceptible trees. This opinion is compared with opinions reported from Florida, California, and Arizona. [Authors' summary.]—Tex. agric. Exp. Stat. and U.S.D.A.

Citrus—tree composition and nutrition.

(*See also* 3892b, h.)

3832. Jones, W. W., Embleton, T. W., and Cree, C. B.
Number of replications and plot sizes required for reliable evaluation of nutritional studies and yield relationships with citrus and avocado.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 209-16, bibl. 17.

In field nutritional studies in citrus and avocado orchards, we have found that fruit yields from individual plots are much more variable than leaf composition or certain fruit quality factors. The data emphasize that in the planning of orchard experiments the probable variability of the factors to be measured should be known. On the basis of our experience with oranges, lemons, and avocados, we have presented a series of curves which should be helpful in designing field experiments with these and other tree crops. [Authors' summary.]—Univ. Calif., Riverside.

3833. Iyer, T. A. G., and Iyyangar, T. R.
A study of the decline of orange in Wyanad.
South Indian Hort., 1956, **4**: 70-81. bibl. 8.

Low pH and the consequent poor lime status and lack of available nutrients are considered to be the main causes in the decline of mandarins in the area since 1942. Statistical examination of rainfall data shov no abnormality during recent years to account for th decline. Long-range experiments on liming an nutrition in general and a soil survey to demarcat areas suitable for cultivation are suggested as remedia measures.

3834. Praloran, J. C., and Minot, F.
L'alimentation minérale des orangers d'après l'analyse des feuilles. (Premières recherches sur le diagnostic foliaire des agrumes au Maroc.) **(The mineral nutrition of orange trees as determined by leaf analysis. (Preliminary studies on foliar diagnosis of citrus in Morocco.).)**
Plant Analysis and Fertilizer Problems, I.R.H.O., Paris, 1957, pp. 322-35, bibl. 9.
Praloran, J. C.
Perspectives offertes par l'usage de la méthode du diagnostic foliaire à la fumure minérale des agrumes. **(Prospects presented by the use of the method of foliar diagnosis in the mineral nutrition of citrus.)**
Terre maroc., 1957, **31**: 121-2.

Studies over a period of 2 years led to the followin conclusions: (1) Leaf content of N was directly relate to the amount of N fertilizer applied; this was onl the case with P at certain seasons, and applications c K were not reflected in leaf composition. (2) Lea contents of N, P and K increased greatly during th flowering period. (3) Time of application of fertilizer appears to be less important than the maintenance of constant satisfactory level of nutrients in the soi (4) Yields can vary greatly from year to year withou causing much change in the nutrient status of th trees, and there is no direct relationship betwee yields and leaf levels of N, P and K. (5) The relativ proportions of N, P and K in the leaves are much mor important than the actual amounts present in determining the nutrient status of the tree.—Sec. Exp. Serv Hort. Rabat, Maroc.

3835. Wallace, A., and Mueller, R. T.
Ammonium and nitrate nitrogen absorption from sand culture by rough lemon cuttings.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 183-8, bibl. 12.

A factorial study was made to determine effects c nitrate : ammonium N ratios, pH of nutrient solutior and pretreatment with ammonium and nitrate N on th absorption of ammonium and nitrate N from san cultures by rough lemon cuttings. N^{15} isotope tecl niques were used. Generally, but not always, ammc nium was absorbed more rapidly than nitrate N. Th average ratio was 1·84. Pretreatment with ammoniur N reduced total N uptake, but pretreatment wit nitrate increased it under certain conditions. Absorp tion of ammonium N tended to increase with increasin pH, but the absorption of nitrate N decreased wit increasing pH only at the highest application rate. Th most pronounced effect of pH for both sources wa at 8 m.e., and in either case a pH effect was absent 2 m.e. per l. Published reports in the literature c pH effect on ammonium or nitrate N absorption ma hold only for relatively high application rates. [Author summary.]—Univ. Calif., Los Angeles.

836. SMITH, P. F.
Studies on the growth of citrus seedlings with different forms of nitrogen in solution cultures.
Plant Physiol., 1957, **32**: 11-15, bibl. 16, illus.

reshly germinated Pineapple sweet orange seedlings ere grown for periods up to 15 months in aerated olutions with N supplied in 2 forms. Seedlings grown ith ammonium N were similar to those grown with ll or part of their N supplied as nitrate, except that oot growth was somewhat less. When the solution H was maintained at about 4·0 growth was reduced respective of N form, but growth reduction and cidity were greater in the ammonia cultures than in the itrate cultures. The growth reduction was accom-anied by a reduced concentration of base cations in the aves, but it is considered that this effect is not a rimary cause of reduced growth under acid conditions. -U.S.D.A., Orlando, Fla.

837. FORD, H. W., SMITH, P. F., AND REUTHER, W.
The influence of excessive nitrogen on citrus root development.
Citrus Mag., 1957, **19**(10): 14-15, 29, bibl. 9.

a Valencia orange manurial trial established on a e sandy soil in 1947 the trees received 3 levels each N, P and Mg in all possible combinations. Six ars later root sampling revealed that the highest N vel had resulted in significant reductions in the num-er of feeder roots in each of 3 depth zones. In a cond experiment involving 2 N levels the N rate and ne of N application had no marked effect on root stribution in the 4th year after treatments started, but the 5th and 6th years the high-N trees had signi-cantly fewer feeder roots, especially in the 10–30-inch ne. The time of applying N also affected root tribution, but the effect was not consistent and may ave been affected by the biennial bearing habit of the ees. Further study will be needed to obtain an planation of the depressing effect of high N on root evelopment.—Fla Citrus Exp. Stat., Lake Alfred, and .S.D.A. [See also *H.A.*, 26: 2080.]

838. FOURIE, S., AND JOUBERT, G. F.
The effect of potash and phosphate on the yield and "creasing" of navel oranges in the Citrusdal area.
Citrus Gr, 1957, No. 277, pp. 1-3.

he application of 3 lb. muriate of potash per tree to avel orange trees increased weight of fruits not ffected by creasing by 25·1%. There were indications at P applications increased, and that K applications ecreased, the percentage of creased fruit.—W. Prov. ruit Res. Stat., Stellenbosch.

839. JONES, W. W., MARTIN, J. P., AND BITTERS, W. P.
Influence of exchangeable sodium and potassium in the soil on the growth and composition of young lemon trees on different rootstocks.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 189-96, bibl. 6.

rees of 7 different rootstocks having Allen Eureka lemon tops were grown on soils representing 11 different ratios of Ca, K, and Na. Total growth of all rootstocks was reduced by increasing Na and/or K. At intermediate Na concentrations K reduced the detrimental effects of Na. Total growth on all soils was greatly influenced by rootstocks, as were contents of Ca, Mg, K, and Na, in the plants, but the differences in growth of plants on the various rootstocks was not closely related to the differences in contents of Ca, Mg, K and Na induced by the different rootstocks. [From author's summary.]—Univ. Calif., Riverside.

3840. PEARSON, G. A., GOSS, J. A., AND HAYWARD, H. E.
The influence of salinity and water table on the growth and mineral composition of young grapefruit trees.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 197-203, bibl. 5.

Preliminary results were reported earlier of an experiment, in which grapefruit trees budded on the relatively salt-tolerant Cleopatra mandarin were subject to 4 water-table treatments and 3 levels of salinity in irrigation water [see *H.A.*, 23: 2164]. In general, there was an inverse relationship between growth, as measured by fresh weight of tops or increase in bole diameter, and the conductivity of the saturation extract, which was in turn related to the conductivity of the applied irrigation water. The salinity factor was responsible for about 90% of the variance in growth and the water-table factor for about 4%. A conductivity value of about 4 millimhos in the saturation extract was associated with a 50% decrease in bole area. The leaf concentrations of Ca, Mg and K appeared to be adequate in all treatments. Saline irrigation water resulted in the accumulation of Na and Cl in toxic amounts, and these were related to the growth responses obtained.—U.S. Salinity Lab., Riverside, Calif.

3841. COOPER, W. C.
Comparison of several iron-chelating agents in correcting iron chlorosis in Dancy tangerines in the Rio Grande Valley.
J. Rio Grande Valley hort. Soc., 1957, **11**: 11-13, bibl. 5.

Three-year-old Dancy tangerine trees on Cleopatra mandarin rootstock, growing in a commercial orchard on calcareous soil and showing severe iron chlorosis, were given soil applications of Versenol Iron Chelate NaFe, Chel 138 HFe, RA 157 Fe and RA 159 Fe at the rates of 1 to 5 grams of metallic iron per tree. The decrease in iron chlorosis during a 2-month period following treatment was used as an index of the effectiveness of the materials. At a 5-gram rate of application Versenol Iron Chelate NaFe was ineffective, RA 159 Fe slightly effective, and Chel 138 HFe and RA 157 Fe were highly effective. The last two were also highly effective at a 1-gram rate of application. [Author's summary.]—U.S.D.A. and Tex. agric. Exp. Stat., Weslaco.

3842. HILGEMAN, R. H.
Response of orange trees growing in the Salt River Valley of Arizona to chelated iron compounds.
J. Rio Grande Valley hort. Soc., 1957, **11**: 14-20, bibl. 5.

Tests were made with chelated iron compounds in 4 groves between 1953 and 1956. Rapid and almost complete regreening was obtained from Chel.138 HFe applied at rates of 12 or 24 grams or iron per tree. Less rapid but satisfactory regreening was obtained from RA 157 Fe and from Sequestrene 330 Fe, applied, respectively, at rates of 48 amd 96 grams of iron per tree. Sequestrene 330 Fe was approximately equally effective in four soil types with trees growing on both sour and sweet orange rootstocks. The best results were obtained when the materials were applied during May by broadcasting uniformly in a basin extending over the entire root area and irrigating into the soil. [Author's summary.]—Univ. Ariz. Citrus Exp. Stat., Tempe.

3843. Armstrong, W. W., Jr.
Comparison of several materials in correcting iron chlorosis of trifoliate orange and Rangpur lime seedlings in California.
J. Rio Grande Valley hort. Soc., 1957, **11**: 21-7, bibl. 11, illus.

This paper reports the results of 3 trials of calcareous soils. (1) In Oct. 1956, 29 months after the treatment of trifoliate seedlings in the Coachella Valley of California [see *H.A.*, 26: 4051], only trees on soil that had been treated with the two highest rates of ferrous sulphate were still less chlorotic than the controls. (2) In a commercial nursery repeated soil applications of ferrous sulphate each of 25 lb. per 1,000 sq. ft. produced healthy trifoliate plants, twice the size of chlorotic controls. (3) In 1956 5 chelates were applied at rates of 0·5 to 4·0 g. per sq. ft. to trifoliate orange and Rangpur lime seedlings growing in soil containing over 10% $CaCO_3$. The Rangpur limes reacted with such variability that none of the differences between treatments was significant. With the trifoliate oranges the most effective non-toxic material was RA 157 Fe. Sequestrene 330 Fe was also effective at the 0·5 g. rate, but was toxic at higher rates. The other chelates, Sequestrene NaFe, Chel 138 HFe and RA 159 Fe, were either ineffective or toxic.—U.S. Date Field Stat., Indio, Calif.

3844. Carpena, O., Guillén, M. G., and Sánchez, J. A.
La clorosis ferrica del limonero. I. II. **(Iron-deficiency chlorosis in lemon. I. II.)** [English summaries ¼ p. each.]
An. Edafol. Fisiol. veg., 1957, **16**: 259-72, bibl. 46, illus.; 273-92, bibl. 70, illus.

Lemon trees in Murcia (Spain) suffering from severe chlorosis responded in 5–8 days to petiolar injections of ferrous sulphate, with or without a chelating agent, by regaining chlorophyll in the leaves below the point of treatment. Where small branches were immersed in the solution the treated leaves responded in 8 days. Necrosis and defoliation sometimes occurred with 0·025% solutions, but production of new normal leaves followed. There was no definite response to Zn or Mn. Leaf analysis figures were very low for Fe, low for Ca and high for K in chlorotic leaves. The calcareous soil was low in available Fe. Excellent results were obtained with 3-year-old trees by applying ordinary ferrous sulphate to the soil at 250 g. per tree in March and July. Trees aged 25–30 years showed practically no response to soil applications or to injection or spray treatments with this substance, but spraying with ferrous ammonium sulphate caused marked improvement. Chelates were used at higher concentrations than usual (0·1–0·15%) and gave good results; they were more consistent and generally more economic as foliar sprays than as soil treatments. The EDTA product Chel 330 Fe, containing 10·5% of Fe, was the most promising chelate.

Citrus—growth phenomena.

3845. Baldini, E.
Indagini ed osservazioni sul sistema radicale degli agrumi. **(Work and observatious on citrus root systems.)**
Riv. Agrum., 1957, **2**: 11-30, bibl. 50, illus.

A discussion of similar work by other investigators in the U.S.A., North Africa and elsewhere is followed by an account of the author's own investigations near Catania in Sicily on the roots of sour orange worked either to mandarins or to Sanguinello or Ovale sweet orange varieties. Most of the roots were found between 10–20 and 40–70 cm. in depth. In open soils the maximum depth reached was 1·50 m., in more compact soils 1·0 m. Their spread reached a distance of 4 m. from the trunk, which means that a great part of the feeder roots were actually outside the skirt of the trees. The chief conclusion reached is the advisability of spacing more widely than is the present custom in Sicily, viz. 4–7 m. for lemon, 3–5 for orange and 3–3·5 for mandarin trees.

3846. Balakrishnan, S., and Gopalakrishnan, P. K.
A note on the risk of growing *Calopogonium muconoides* as a cover crop in three basins of mandarin orange.
South Indian Hort., 1956, **4**: 89-91, bibl. 1.

In an experiment comparing 6 methods of soil management, i.e. manuring and no weeding, manuring and digging, manuring and mulching, digging round the plants, mulching the tree basins, and growing *Calopogonium muconoides* in the tree basins, the last resulted in the least tree growth in terms of height and stem girth. It is considered advisable to limit this cover crop to the interrows.

3847. Stevenson, F. F.
The behavior of citrus tissues and embryos *in vitro*.
Diss. Abstr., 1956, **16**: 2292-3, being *Publ.* 18,665 of 123 pp.

In Part 1 the author describes the origins of callus tissues from the stigma, style, ovary contents and juice sacs of a lemon and a sour orange. Calluses produced by the lemon were readily distinguished from those produced by the sour orange, but within the species tissues of different structural origin appeared identical. Maximum growth occurred when coconut milk was added to the basic agar medium plus modified White's solution; growth was largely confined to regions near the margin of calluses. In Part 2 the normal development of sour orange embryos is described and contrasted with the behaviour of nucellar and gametic embryos of sour orange and calamondin in artificial culture. White's medium alone was insufficient for growth of proembryos and embryos excised at the time of early cotyledonary formation, but some growth and differentiation occurred when coconut milk was added to the medium. A more normal growth pattern was obtained from proembryos cultured in a liquid medium than on agar. Embryos excised at the stage of early cotyledon formation formed 3 kinds of cotyledons when cultured in liquid or on agar. Embryos did not root until they reached 10 to 12 mm. in length. Embryos capable of root and shoot formation could be obtained from green fruits within 5 to 6 months after pollination, and 3 to 4 months before the fruits ripened.—Univ. Michigan.

3848. Chaudhri, S. A.
Some anatomical aspects of fruit drop in citrus.
Diss. Abstr., 1957, **17**: 938-9, being *Publ.* 20,769 of 110 pp.

The anatomical and metabolic processes of fruit abscission in Hamlin oranges have been studied and are described. Pedicel treatment with expressed orange leaf or seed sap, sucrose, 2,4-D or IAA appeared to inhibit fruit abscission.—Univ. Florida.

Citrus—diseases and pests.

(*See also* 3307, 3892k, l, p-r, t, v-x, z, 3893b, d, g, i.)

3849. Olson, E. O., Cooper, W. C., and Shull, A. V.
Effect of bud-transmitted diseases on size of young Valencia orange trees on various rootstocks.
J. Rio Grande Valley hort. Soc., 1957, **11**: 28-33, bibl. 11.

After 6 years growth Valencia trees on 5 rootstocks infected with exocortis were between 39·7 and 61·8% smaller in trunk cross-sectional area than comparable trees on healthy stocks. Another series of trees on a further 12 rootstocks infected with xyloporosis were between 3·7 and 70·0% smaller than comparable trees on healthy stocks. When 6 trees used as budwood sources were subsequently indexed for viruses 2 trees were found to carry psorosis, 1 exocortis and xyloporosis, and 3 were free from these viruses. After 3½ years growth from budding, psorosis had had little effect on tree size, but exocortis and xyloporosis had resulted in reductions ranging from 11 to 69%.—Tex. agric. Exp. Stat. and U.S.D.A.

3850. Moore, P. W., and Nauer, E.
Scaly bark disease of citrus.
Calif. Agric., 1957, **11**(6): 11, 15, illus.

A 9-year study of the development of psorosis or scaly bark in 7 orange orchards ranging from 36 to 56 years of age has shown that the progress of the disease to new trees and from the first to more advanced stages of infection [see *H.A.*, 27: 2787] may be faster than is generally believed.—Univ. Calif., Riverside.

3851. Wallace, J. M.
Tristeza and seedling yellows of citrus.
Plant Dis. Reptr, 1957, **41**: 394-7, bibl. 3, illus.

In California seedling yellows virus has not been encountered in sweet orange or other citrus known to have been naturally infected with tristeza (quick decline) virus. Recent studies show that the causal virus of seedling yellows is carried by plants of Meyer lemon, Satsuma orange, and other citrus varieties known to be infected with tristeza virus and believed to have been carriers of the virus when originally imported to the United States. Work is in progress to determine if the seedling yellows reaction is caused by a virus distinct from tristeza virus, as suggested by Fraser [*H.A.*, 22: 4261], or if it is a strain of the latter. [From author's abstract.]—Univ. Calif., Riverside.

3852. Grant, T. J., and Higgins, R. P.
Occurrence of mixtures of tristeza virus strains in citrus.
Phytopathology, 1957, **47**: 272-6, bibl. 20.

Tristeza virus from selected sources caused very mild, mild or severe symptoms of stunting, vein and veinlet clearing in the leaves, and pitting of the stems beneath the bark of Key lime test plants. Branch growth of the inoculated Key lime plants was proportional to the severity of symptoms induced by the tristeza virus employed. Repeated selections and transmissions by leaf pieces from mildly affected sources have indicated that mild tristeza virus in Florida is a virus that mutates readily or that exists as a mixture of strains, some of which consistently cause stem pitting and others few or no stem pits on Key lime plants. Cross-protection tests with selected virus sources resulted in varying degrees of protective effects. The explanation for the presence of virus strain mixtures within a given plant appears to be related to the failure of any one strain to become thoroughly systemic, thus affording susceptible sites for the development of other strains. [Authors' summary.]—U.S.D.A., Orlando, Fla.

3853. Schneider, H.
Chronic decline, a tristeza-like bud-union disorder of orange trees.
Phytopathology, 1957, **47**: 279-84, bibl. 7, illus.

Chronic decline, a bud-union disorder of sweet orange trees on sour orange rootstock, causes trees to decline in various degrees. A necrosis of sieve tubes occurs below the bud union and may, when sufficiently extensive, produce typical girdling effects. In most trees additional anatomical abnormalities that are distinctly different from those of tristeza accompany the necrosis. Excessive numbers of fibers and crystal idioblasts are produced. Immediately below the bud union, the fusiform rays may become much elongated vertically and some become hyperplastic and woody. Bark thickening occurs below but not above the bud union. There was a positive correlation between the amount of functioning phloem and the amount of starch in roots. [Author's summary.]—Univ. Calif., Riverside.

3854. Suit, R. F., and DuCharme, E. P.
Search for ideal control of spreading decline continues.
Citrus Ind., 1957, **38**(6): 6-7, 22.

Numerous chemical and other methods, conventional and unconventional, tested for the control of the burrowing nematode, *Radopholus similis*, are mentioned, but so far only the pull-and-treat method has given effective control.—Fla Citrus Exp. Stat., Lake Alfred.

3855. Schuster, M. F., and Dean, H. A.
Some species of ants in the citrus grove and their control.
J. Rio Grande Valley hort. Soc., 1957, **11**: 44-50, bibl. 16.

Details are given of formulations, concentrations and methods of application of chlordane, dieldrin and heptachlor found effective in 2 years' tests in citrus groves against the fire ant (*Solenopsis geminata*), the harvester ant (*Pogonomyrmex barbatus* var. *malefaciens*) and the acrobatic ant (*Crematogaster* spp.).

3856. Jeppson, L. R., and others.
Effectiveness of 4,4′-dichloro-alpha-(trichloromethyl) benzhydrol (FW-293) for control of citrus mites in California.
J. agric. Food Chem., 1957, **5**: 592-5, bibl. 2.

In studies conducted in 16 southern California citrus groves, 4,4′-dichloro-α-(trichloromethyl) benzhydrol, or FW-293, was found to be effective in controlling the citrus red mite, *Metatetranychus citri*. This material also controlled the citrus flat mite, *Brevipalpus lewisi*, in three citrus groves but was not so effective as petroleum oil (light-medium grade) or Chlorobenzilate in controlling the citrus bud mite, *Aceria sheldoni*. In limited field trials it caused initial reduction in populations of the six-spotted mite, *Eotetranychus sexmaculatus*, the Yuma mite, *Eotetranychus yumensis*, and the citrus rust mite, *Phyllocoptruta oleivora*. [From authors' abstract.]—Univ. Calif., Riverside.

3857. Gunther, F. A., and others.
Field persistence of the acaricide 4,4′-dichloro-alpha-(trichloromethyl)-benzhydrol (FW-293) on and in mature lemons and oranges.
J. agric. Food Chem., 1957, **5**: 595-8, bibl. 5.

Residues of the new acaricide, 4,4′-dichloro-α-(trichloromethyl) benzhydrol, or FW-293, were determined on and in lemons and oranges and in dried citrus cattle feed resulting from these fruits. The longevity of these residues is illustrated by the half-life values of 170 to 350 days for Valencia oranges and 120 to 150 days for lemons. Comparisons of the magnitudes of the residues obtained simultaneously by three methods indicate little if any metabolic or other degradation of FW-293 residues *in situ*. Negligible amounts of FW-293 were found in edible portions of the fruit. The peel retained approximately 30% of its FW-293 residues after being processed into dried citrus cattle feed. [Authors' abstract.]—Univ. Calif., Riverside, and Rohm and Haas Co., Philadelphia, Pa.

3858. Gaprindašvili, N. K., and Novickaja, T. N.
Systemic insecticides and the biological control of pests. [Russian.]
Agrobiologija, 1957, No. 1, pp. 104-8.

Results of laboratory and field experiments in Georgia showed that schradan at 0·2–0·3% concentrations gave 100% control of red mite, *Metatetranychus citri*, on citrus and was only slightly less effective against rust mite, *Phyllocoptruta oleivora*, but did not affect the entomophagous insects *Cryptolaemus montrouzieri*, *Rodolia cardinalis*, *Lindorus lophanthae*, *Chilocorus bipustulatus* and 5 predaceous mite species. Demeton at 0·1% was also effective against red and rust mites but proved highly toxic to the parasites and predators; hence its use on citrus is not recommended.

3859. Klapperich, B. J.
Control of the oriental red mite on citrus seedlings in Jordan.
FAO Plant Prot. Bull., 1957, **5**: 57-8.

Solutions of 0·1% or 0·2% Systox watered on citrus seedlings gave excellent control of the oriental red mite, *Anychus orientalis*. Systox solutions also controlled cockchafer larvae on *Acacia* and *Eucalyptus* seedlings.

3860. Ohta, K.
The preparation and insecticidal activity of some aryl benzenesulphonates. [Japanese, with English summary 13 lines.]
Botyu-Kagaku, 1957, **22**: 251-5, bibl. 9.

Nine aryl benzenesulphonates were tested for their acaricidal and ovicidal activity against adults and eggs of the citrus red mite (*Metatetranychus citri*) on leaves of trifoliate orange. 2,3,4,6-Tetrachlorophenyl benzene sulphonate gave 59% kill of adults and 4-nitrophenyl benzene sulphonate proved the best ovicide (49% kill), but both were less effective than Ovotran. All showed low insecticidal activity when tested against the bean weevil (*Callosobruchus chinensis*). J.R.L.

3861. Fisher, F. E.
A summer application of zineb for the control of citrus fruit russet.
Citrus Ind., 1957, **38**(5): 5-6.

In large scale tests in 1956 on several grapefruit, orange and tangerine varieties a single application of zineb at 1 lb./100 gal. between July 2 and August 3 controlled russet in every case, producing cleaner fruit than 5 applications of sulphur. Following zineb the population of rust mites (*Phyllocoptruta oleivora*) remained low for 7 months, but further work will have to be done to determine if zineb has any acaricidal action and to discover if the rust mite or a fungus or both are the real cause of russeting.—Fla Citrus Exp. Stat., Lake Alfred.

3862. Costantino, G.
La lotta contro le cocciniglie degli agrumi mediante emulsioni di olii minerali e di esteri fosforici, da sole o in miscela. (**The control of citrus scales by mineral oil emulsions and phosphoric esters alone and mixed.**) [English summary ½ p.]
Ann. Sper. agrar, 1957, **11**(3), Suppl. pp. cxxi-clvii, bibl. 60.*

Control of citrus scale being compulsory in Sicily and Southern Italy, liquid treatments are adopted in cases where fumigation with HCN is impossible. Emulsions of mineral oils alone lead to tree damage, but a reduction in strength of mineral oil plus the addition of parathion avoids damage and is efficacious. The author tabulates and discusses results of trials in Calabria in which mineral oil emulsions alone were used, emulsions associated with products based on phosphoric esters used immediately after preparation, and formulae based on oleo-parathion sold ready for use. He proposes and displays a calendar of liquid anti-scale treatments based on biological findings gathered in 15 years observations. This incidentally shows the biological stages of 9 species of scale throughout the year.—Osserv. reg. Fitopat., Catanzaro.

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* Previously noted in *H.A.*, 27: 838m.

3863. Vergani, A. R.
Lucha contra las plagas. Cochinilla roja australiana. Mosca de los frutos. **(Pest control. Red scale. Fruit fly.)**
Idia, 1956, Nos. 106/8, pp. 172-4.

Control of red scale (*Aonidiella aurantii*) of citrus was practically perfect with a mixture of parathion (25% wettable) at 0·4% and 2% oil [see also *H.A.*, 27: 1839]. Parathion without the oil gave 95–98% kill and with 0·5% oil emulsion 95% kill. Suitable times for treatment in the Concordia province of Argentina are given. *Ceratitis capitata* was responsible for 21% of the premature fall of citrus fruit. Good control was achieved by spraying, at 20-day intervals during ripening, with 0·3% DMDT (methoxychlor). A very successful bait was made from approximately equal weights of sodium fluosilicate and fish meal with molasses and water, or from DDT mixed with either pyrolan or diazinon, molasses, cold glue and water. The first mixture was applied weekly and the second at 3-weekly intervals during ripening.

3864. Lespes, L.
Essais de lutte contre le pou rouge californien, *Aonidiella aurantii.* **(Experiments on control of the Californian red scale, *Aonidiella aurantii*.**
Terre maroc., 1957, **31**: 146-50.

Treatments of trees decreased in effectiveness against adult females in the order: (1) fumigation with HCN at 6 g./cu.m., (2) the same at 4·2 g./cu.m., (3) spraying with 1% white oil+30 g. parathion/hl. and (4) 2% white oil without parathion. All these treatments were fully effective against larvae. In very heavily infested nurseries concentrations of HCN up to 12 g./cu.m. and 3–4 annual treatments were necessary. The foliage of healthy trees was improved, but that of weak ones was shed after the second fumigation. In oil-parathion mixtures, raising the proportion of parathion from 30 to 45 or 60 g. per hl. progressively reduced their effectiveness. Even with fumigation the unhatched larvae were highly resistant.

3865. Riehl, L. A., Jeppson, L. R., and Wedding, R. T.
Effect of timing of oil spray applications during the fall on juice quality and yield of lemons in two orchards in southern California.
J. econ. Ent., 1957, **50**: 74-6, bibl. 11.
Effect of oil spray on lemons.
Calif. Agric., 1957, **11**(7): 13.
Calif. Citrogr., 1957, **42**(12): 446-7.

The effect of single annual applications of oil spray to lemon trees, in any of the months from August through January, on the juice quality and yield of lemons in two southern California orchards was studied for the seasons of 1952 through 1955. Within the conditions of the experiments, the evidence supports the conclusion that differences in juice quality and in yield between the treatments were not real and consistent but were within the limits of natural variation. [Author's summary.]—Univ. Calif., Riverside. [For similar work on Valencia oranges see *H.A.*, 27: 795.]

3866. Riehl, L. A., and others.
Effects of oil spray and of variation in certain spray ingredients on juice quality of citrus fruits in California orchards, 1950-1953.
J. econ. Ent., 1957, **50**: 197-204, bibl. 17.

Several trials are reported in which juice quality characteristics of Valencia and Navel oranges and of lemons were compared following treatment of the trees with 12 different types of oil spray, and with parathion, Aramite, and HCN fumigation. Although in a few cases significant reductions in soluble solids were recorded following the use of oils, especially highly paraffinic types, the differences between treatments were for the most part insignificant. Possible reductions in soluble solids could probably be avoided by making the oil applications in August and September and by ensuring that proper procedures for mixing and applications are followed.—Univ. Calif., Riverside. [See also next abstract and *H.A.*, 27: 795.]

3867. Vergani, A. R.
Aceites minerales insecticidas. **(Insecticidal mineral oils.)**
Idia, 1956, Nos. 106/8, pp. 174-5.

Four different mineral oils were applied to a grapefruit, an orange and 2 mandarin varieties in October, November, December and March in Concordia, Argentina. Tabulated results show the effects of choice of oil and spraying date on production, which in some instances was lower in treated than in untreated trees. There were considerable varietal differences in both respects. [See also *H.A.*, 27: 1841.]

3868. Turrell, F. M., Cohan, M. S., and Horspool, R. P.
The mode of action of elemental sulfur in "sulfur-burn".
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): vii.

When lemon fruits were dusted with S^{35}, injury to the plant cell appeared to result from a rapid oxidation of sulphur to SO_4, which in turn reacts readily with the protein.—Univ. Calif., Riverside.

Citrus—fruit composition, storage and products.

(*See also* 3892s, 3893e.)

3869. Erickson, L. C.
Citrus fruit grafting.
Science, 1957, **125**: 994, bibl. 6, illus.

Immature fruits of Faris sweet lemon were successfully grafted on Ross Eureka plants in the greenhouse. Analysis of mature fruits showed that the acid content remained low, but where scion leaves had been allowed to grow the acid content (1·31%) was greater than where scion sprouts had been removed (0·32%). In a second experiment Ross Eureka plants were grafted with scions of Ross Eureka or Faris, and sweet or sour lemon fruits were grafted on when the shoots were 2 to 4 ft. long. All the Faris sweet lemon fruits remained low in acid concentration, whether nourished by leaves of sour or sweet lemon plants, and their reducing sugar concentration was higher than that of sour lemons. The contents of total soluble solids were similar in the 2 types of fruit.—Univ. Calif., Riverside.

3870. Bean, R. C.
Utilization of C^{14}-labeled glucose in various tissues of lemon fruit.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xxx.

The sugar metabolism of lemon fruits was studied using randomly C^{14}-labelled glucose. In albedo tissue there was an indication of extensive use of glucose in polysaccharide formation. For a given age of fruit the rate of assimilation of glucose activity into other alcohol-soluble compounds was greatest in the juice sacs. Sucrose was synthesized in the flavedo, albedo and juice sacs, despite its low accumulation in the fruit. —Univ. Calif., Riverside.

3871. Curl, A. L., and Bailey, G. F.
The carotenoids of tangerines.
J. agric. Food Chem., 1957, **5**: 605-8, bibl. 17.

The carotenoids in tangerine peel and pulp (fruit flesh) have been fractionated by counter-current distribution, followed by chromatography. Factors contributing to the redder color of the tangerine, as compared to the orange, were much higher concentrations of cryptoxanthin (pulp and peel), β-carotene (pulp), and a hydroxy-canthaxanthin-like substance (peel). Minor constituents, not previously reported from oranges included lycopene, γ-carotene-like and hydroxy-canthaxanthin-like fractions from the pulp, and lycopene and a rubixanthin-like fraction from the peel. A minor phytofluene-like band was found on chromatography on the column between α-carotene and β-carotene, in both pulp and peel carotenoids. [Authors' abstract.]—West. Utiliz. Res. Br., U.S.D.A., Albany, Calif.

3872. Grierson, W.
Operation of citrus degreening rooms.
[*Fla*] *Citrus Stat. Mimeo Rep.* **57-1**, 1956, pp. 5, illus.

Recommended conditions are: Dry bulb temperature 85° F. Wet bulb temperature 82–83° F. Ethylene delivery at one bubble per minute per ten box capacity. Continuous air circulation within the room and ventilation sufficient to prevent accumulation of waste gases. [Authors' summary.]

3873. Withers, R. B.
Fruit fly. Technical committees' report on 1955-56 results of sterilisation by cold storage and fumigation.
Citrus News, 1957, **33**: 44-5.

Tests have shown that oranges can be sterilized against the Queensland fruit fly [*Stumeta tryoni*] by holding them for 14 days at 31° F. Valencias and most navels suffered no damage, but late-picked navels from some areas were injured. In fumigation tests a dosage of 1 lb. EDB per 1,000 cu. ft. for 2 hours at 70° F. appeared to be the upper limit from the point of view of fruit injury, but, though usually lethal to the fruit fly, it was not invariably so. Further studies on fumigation, now in progress, are outlined.

3874. Hudault, E., and Guillemenet, R.
Note sur des essais de désinsectisation des oranges à l'acide cyanhydrique et au bromure de méthyle, effectué à l'Inspection de la Défense des Végétaux de Casa en 1950. **(Note on insect control on oranges with hydrocyanic acid and methyl bromide, carried out by the Inspection of the Plant Protection Service at Casa[blanca] in 1950.)**
Terre maroc., 1957, **31**: 180-5.

Fumigation with 4–5 g./cu. m. HCN for 1 hour gave effective scale control on harvested oranges without scorching the fruit. The best concentration of methyl bromide was 50 g./cu. m. applied for 1 hour. At high temperatures HCN is the safer material.

3875. Beavens, E. A., and others.
Chemistry and technology of citrus, citrus products, and byproducts.
Agric. Handbook U.S. Dep. Agric. **98**, 1956, pp. 99, bibl. 495, illus., 50 cents.

A consideration of the components of citrus fruits is followed by an account of the various processes to which this fruit is submitted and its final products, e.g. juices, frozen concentrates, by-products such as pectin, essential oils, candied peel, etc. Finally the manipulation and disposal of the waste products as feed, molasses, feed yeast, industrial alcohol and lactic acid are detailed.

Dates.

3876. Rao, J. S.
Polyembryony in *Phoenix dactylifera* L.
Sci. and Cult., 1957, **22**: 868-7, bibl. 6, illus.

Among date seedlings raised from about 250 seeds 11 showed polyembryony. The latter included normal twin seedlings and two abnormal types.—Agric. Res. Inst., Coimbatore.

Olives.

(*See also* 3892c, d, o, 3893j.)

3877. Baldini, E., and Scaramuzzi, F.
Contributo allo studio delle cultivar di olivo da tavola. **(Contribution to the study of table varieties of olive.)** [English summary 6 lines.]
Riv. Ortoflorofruttic. ital., 1957, **41**: 136-79, bibl. 132, illus.

The varieties described in detail, with the aid of illustrations, are Ascolana tenera, Ascolana dura, Bella di Spagna, Carmelitana, Dolce del Marocco, Gordales, Grossa di Spagna, Itrana, Manzanilla, Pasola, S. Agostino, S. Caterina, S. Francesco, Uovo di piccione and Verdale.

3878. Baldini, E., and Scaramuzzi, F.
Indagini ed osservazioni sugli sferoblasti dell'olivo. **(Investigation and notes on olive sphaeroblasts.)** [English summary ½ p.]
Ann. Sper. agrar, 1957, **11**: 723-40, bibl. 29, illus.

The authors describe the anatomical characteristics and origin of the sphaeroblasts of olive trees. Unlike ovoli, from which they must be distinguished, sphaeroblasts originate in the outer phloem. Under the induction of the sieve tissues a meristem is formed around the fibre bundles, which in turn induces lignification of the parenchyma originated by the new meristem. They develop thus in the bark unconnected, at least initially, with the cambium and the central woody cylinder. They may carry buds and shoots. They are similar to sphaeroblasts carried on other fruit trees, the incidence of which is discussed by the authors and has been noted and described elsewhere [e.g. *H.A.*, 25: 3526 and 26: 3355].—Ist. Colt. Arbor., Univ. Firenze.

3879. Carrante, V., and Di Prima, S.
Otto anni di esperienze sui migliori sistemi di potatura dell'olivo in Puglia. **[Eight years of experimentation on the best systems of pruning olives in Apulia.)** [English summary ¾ p.]
Ann. Sper. agrar., 1957, **11**: 449-86.

The globular formation of trees pruned by the traditional Bari method was subjected to 3 modifications, none of which proved significantly superior to the original. Further records will be kept.

3880. Lalatta, F., and Sforza, L. C.
Prove di diradamento chimico dell'olivo. **(Experiments on chemical thinning of olives.)**
Reprint from *Olivicoltura*, 1956, No. 9, pp. 7, bibl. 11.

Spraying with NAA at 120–150 p.p.m. 15 days after the peak of flowering gave only 19-22% higher fruit drop than occurred in unsprayed trees. Fruit size was increased, but the pulp/stone ratio was unchanged. Branches from which all the fruit was picked in mid-July flowered profusely the following year. Application of mineral N in July and August did not retard leaf fall.—Staz. sper. Ortofruttic., Univ. Milano.

3881. Rambelli, A.
L'occhio de pavone dell'olivo in Romagna. **(Olive leaf-spot disease in Romagna.)**
Inf. fitopat., 1957, **7**: 58-60, illus.

Experiments showed that the most important times for treatment were immediately after the first measurable rainfall in spring and autumn. These two treatments are normally sufficient, but a third may be necessary in a very wet autumn. Good control was achieved with either 1% bordeaux mixture, 0·35% zineb or with a cuprous oxide preparation. Adequate spacing of trees and branches was important.—Ist. Pat. veg. Univ. Bologna.

3882. Montironi, R. A.
Olivo. Frantoio variedad resistente a la antracnosis. Pulverizaciones recomendables en montes de olivo. **(Olives. Frantoio, a variety resistant to anthracnose. Spray treatments advisable for olive groves.)**
Idia, 1956, Nos. 106/8, pp. 176-7.

In a severe attack of *Gloeosporium olivarum*, the variety Frantoio was outstanding for resistance and gave high yields of fruit and oil. Leccino was also less susceptible than most of the 70 varieties under observation. Preventive sprays of 0·75–1% bordeaux mixture in January and February are advised for general use in the Concordia district of Argentina against *G. olivarum*. Similar treatment is advised in October and November after flowering, against cercosporiosis and cycloconium leaf spot. Red scale [*Aonidiella aurantii*] is best controlled by summer spraying with 2–3% emulsifiable oils or 1·25–1·5% oil emulsions.

3883. Graniti, A.
Prove di lotta contro la lebbra delle olive in Sicilia con calendari misti, utili anche contro la mosca. **(Experiments on control of olive anthracnose in Sicily with series of combined treatments for simultaneous control of olive fly.)**
Olearia, 1956, **10**: 133-46, bibl. 32, illus.

Control trees remained untreated. All others, having been treated with bordeaux mixture the previous autumn, were sprayed early in September with 0·1% parathion and two subsequent treatments were either 1% bordeaux mixture+0·03% parathion, 0·17% zineb+0·03% parathion, or 0·03% parathion only. Data include: percentages of fruit damaged by fly or anthracnose alone, together, or combined with *Sphaeropsis dalmatica*, *Fusarium* spp. or *Xylaria sicula*; percentage of fruit drop; effects of different treatments on characteristics of oil. Anthracnose infection was 50% and 39% lower with bordeaux mixture and zineb respectively than with parathion alone. The mixed treatments also markedly reduced fly infestation, various fungal infections which commonly follow it, and fruit drop. Acidity of the oil was lowest with bordeaux mixture+parathion, moderate with zineb+parathion and high with parathion alone and in untreated fruit. Parathion residues were less than 0·1 p.p.m.—Ist. Pat. veg. Univ. Catania. [For a brief account see *H.A.*, 27: 828.]

3884. Russo, G.
Stato attuale della lotta contro la mosca delle olive (*Dacus oleae* Gml.). **(Present state of olive fly control.)** [English summary 2 pp.]
Ann. Sper. agrar, 1957, **11**(3), Suppl. pp. ccxxvii-ccli, bibl. 15.

The results of investigations have shown that parathion is lethal to eggs, larvae and adults, but is non-lethal to larvae and pupae of the insect predators of the fly. The systemic organic phosphates Pestox, Systox, Sistemical, dimefox lack systemic action. Emulsionable parathion has a more potent lethal effect that the wettable powder, which again is more potent than parathion in dust form. Of the organic phosphates the best results were given by parathion, followed by diazinon. Malathion and Dipterex gave negative results.—Lab. Ent. agrar. F. Silvestri, Portici. [See also *H.A.*, 27: 2823.]

3885. Touzeau, J.
L'hylésine de l'olivier en Tunisie. **(The olive bast beetle in Tunisia.)**
Tunis. agric., 1957, **58**: 27-38, 41-51, illus.

Hylesinus oleiperda is a serious pest in northern Tunisia, but apparently does little damage elsewhere in the Mediterranean region. In the susceptible variety Chetoui it is checked by irrigation, which promotes a copious flow of sap. In the normally resistant varieties farther south, irrigation raises sap flow from slow to moderate, greatly increasing susceptibility. Control is possible only by insecticidal treatment at the moment of emergence of adults. Lindane emulsion at 12·5 g. of active material per hl. of water brushed on the bark gave excellent control. Dieldrin at 125 g. and BHC at 250 g. of active material per hl. were also very satisfactory. Zeidane and oleoparathion were much less effective, being approximately equal in action to lime at 4 kg. per hl. An excellent treatment applicable to trunks was painting with a paste of parathion emulsion (150 g. of active matter in 1 hl. of water with 20 kg. of clay). Residual control in the year after treatment was excellent with 50 g. (active) dieldrin per hl. sprayed at high pressure, but a hand-operated spray gave poor results. BHC sprayed at 500 g. (active) per hl. gave promising residual control. Lindane-treated groves will be examined in due course for residual effects. In cases where infestation has spread beyond the trunk spraying is more effective, convenient and economic than painting.

3886. Antongiovanni, E.
Lotta contro la tignola dell'olivo con l'impiego della N-monometilammide dell' acido 0,0-dimetilditiofosforilacetico. **(Control of *Prays oleellus* with 0,0-dimethyl S-(methylcarbamyl) methyl phosphorodithioate.)**
Reprinted from *Olivicoltura*, 1956, No. 5, pp. 7, bibl. 2, from abstr. in *Rev. appl. Ent.*, 1957, **45**: 242-3.

Of two new compounds tested for the control of olive moth larvae, 0,0-dimethyl S-(methylcarbamyl)methyl phosphorodithioate appeared to be the more effective. A low-volume spray at 0·06% and a dust at 3% of this material gave complete or almost complete control of the mining larvae within 12 days.

3887. Frezzotti, G., Manni, M., and Aten, A.
Olive oil processing in rural mills.
FAO agric. Develop. Pap. **58**, 1956, pp. 103, bibl. 47, illus.

The subjects covered in this treatise are: the olive tree and its fruit, olive oil and its characteristics; the analysis of olives, oil and residues; pre-processing operations; traditional processing methods; machinery for making olive pastes; machinery for expressing the oil; machinery for separating the oil; single versus double stage processing; guiding principles for milling; treatment of oils; end-of-season operations; and new trends in olive processing. There is also a useful list of selected references.

3888. Cucurachi, A.
Indagini sul contenuto in olio e umidità delle sanse Pugliesi e Lucane. **(Investigations in oil and water contents of olive pulp in Apulia and Lucania.)** [English summary 10 lines.]
Ann. Sper. agrar, 1957, **11**(3), Suppl. pp. CLXXVII-CXCII, bibl. 8.

The average oil and water contents of the pulp of 4460 olive samples taken in 5 seasons were found to vary from 7·50 to 8·00% and from 28 to 31% respectively.

Passion fruit.

3889. Akamine, E. K., and Girolami, G.
Problems in fruit set in yellow passion fruit.
Hawaii Fm Sci., 1957, **5**(4): 3-5, illus.

Pollination and fertilization in *Passiflora edulis* f. *flavicarpa* were studied in a series of experiments. The plants were self-sterile, but the degree of cross-compatibility varied with the strains tested. Wind pollination appeared to be of no importance, but pollination by insects smaller than the carpenter bee was of some importance. Flowers with erect styles did not set fruit. Wetting of the stigmas before pollination resulted in reduced fruit set. Hand pollination gave higher fruit set, larger fruits, more mature seeds and higher juice yields than natural pollination. The number of stigmas fertilized per flower did not affect fruit quality. Fruit drop usually followed attacks by *Dacus dorsalis* when these occurred within 10 days of pollination.

3890. Akamine, E. K., Young, R. E., and Biale, J. B.
Respiration and ethylene production in the purple passion fruit.
Proc. Amer. Soc. hort. Soc., 1957, **69**: 221-5, bibl. 4.

Two experiments are described in which fruits of *Passiflora edulis*, picked when just starting to colour to half-coloured, were held at 20° and 25° C. both in air and in applied ethylene at 500 and 1,000 p.p.m. The results indicate that under ordinary air conditions passion fruit exhibits a typical climacteric and that it produces considerable quantities of natural ethylene. The onset of ethylene production coincided with the onset of the respiratory rise, but the peak of gas emanation, which was exceptionally high, was not reached until several days after the climacteric peak. Applied ethylene caused respiration to reach a peak within a day and promoted full colour development within about a week. With fruits stored in air colour development was slower, particularly at the higher temperature, and lagged behind internal ripening.—Hawaii agric. Exp. Stat., Honolulu, and Univ. Calif. Riverside.

Tung.

(*See also* 3081, 4022.)

3891. Neff, M. S., and Barrows, H. L.
Influence of level, source, and placement on effectiveness of zinc applied to newly planted tung trees.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 176-82, bibl. 7.

Growers commonly apply as much as ¼ lb. zinc sulphate (0·09 lb. Zn) to newly planted tung trees as an insurance against zinc deficiency. The results reported here for 4 experiments indicate that with proper placement much smaller dressings of Zn will suffice. Using levels of 0·009, 0·018 and 0·036 lb. Zn per tree much the greatest uptake, as measured by analysis of leaf Zn and the absence of deficiency symptoms, was obtained when the fertilizer was dusted on the sides as well as the bottom of the planting hole. Surface application resulted in a smaller uptake but was more effective than applications made at the bottom of the planting hole. The absorption of sufficient Zn to prevent deficiency symptoms resulted in some reduction in top growth. In general, zinc sulphate resulted in higher leaf-Zn levels and in more marked growth reductions than did equivalent amounts of zinc carbonate. Lower leaf K and higher leaf Mg seemed to be associated fairly consistently with increases in leaf Zn.—U.S. Dep. Agric., Cairo, Ga, and Gainesville, Fla.

Noted.

3892.

a Blondel, L.
Traits caractéristiques de l'agrumiculture israélienne. **(Characteristic features of citrus cultivation in Israel.)**
Rev. hort. Algěr., 1957, **61**: 55-68, illus.
Where average yields are more than double those of Algeria.

b Cahoon, G. A., and others.
Buying root insurance.
Calif. Citrogr., 1957, **42**: 271, 290-1, illus., and *Citrus Leaves*, 1957, **37**(7): 6-7, 18, illus.
The use of tensiometers and resistance blocks to measure irrigation needs in citrus orchards.

c Castorina, S.
Estrazione del'olio dalle olive per mezzo dell'elettroforesli. II. Comunicazione. L'impianto ed il procedimento di estrazione ed i risultati delle prime prove effetuate su piano industriale. **(Extraction of olive oil by electrophoresis. Part II. Machinery and process of extraction and results of the first tests carried out on an industrial scale.)**
Olearia, 1956, **10**: 188-91, illus.
With a diagram of the machine. [Part I was noted in *H.A.*, 27: 2827d.]

d Ciaravellini, L.
Olivi nel piano-colle della maremma grossetana. **(Olives in the plains and hills of the Grosseto marshland.)**
Frutticoltura, 1957, **19**: 245-57, illus.
Characteristics of the varieties Correggiolo, Moraiolo and Leccino, including pollen compatibility and cold resistance.

e Cooper, St. G. C.
Citrus production in the Santa Cruz and Diego Martin valleys of Trinidad.
J. agric. Soc. Trin. Tob., 1956, **56**: 612-28, bibl. 6, illus.

f Cooper, W. C.
Periodicity of growth and dormancy in citrus —a review with some observations of conditions in the Lower Rio Grande Valley of Texas.
J. Rio Grande Valley hort. Soc., 1957, **11**: 3-10, bibl. 23.

g Corns, J. B.
Trends in citrus fruit production in the Lower Rio Grande Valley.
J. Rio Grande Valley hort. Soc., 1957, **11**: 59-63, bibl. 5.
In Texas.

h Dakshinamurti, C., and Biswas, N. R. D.
Spectrographic analysis of micro-elements in citrus leaves.
Curr. Sci., 1957, **26**: 110-11, bibl. 3.
Method for analysing B, Mn and Zn.

i Durbin, R. D., Frolich, E. F., and Zentmyer, G. A.
Hot-water treatment of avocado seed for eradication of *Phytophthora cinnamomi.*
Plant Dis. Reptr, 1957, **41**: 678-80, bibl. 8.
At 120° or 125° F. for 30 minutes effective without reducing viability.

j Ebeling, W., and Pence, R. J.
Orange tortrix on avocados.
Calif. Agric., 1957, **11**(8): 13-14, illus.
Orange tortrix as a pest of avocados.
Calif. Citrogr., 1957, **42**: 367-8, illus.
Observations on damage caused by, varietal susceptibility to, and control of *Argyrotaenia citruna.*

k Frézal, P.
Sur la présence en Algérie de la tristeza et de la xyloporose des citrus. **(The presence in Algeria of tristeza and xyloporosis of citrus.)**
C.R. Acad. Agric. Fr., 1957, **43**: 353-6.
Tristeza only on Meyer lemon and xyloporosis on Wewika tangelo.

l Friend, A. H.
Artificial infestation of oranges with the Queensland fruit fly.
J. Aust. Inst. agric. Sci., 1957, **23**: 77-80, illus.
As a first step to testing methods of disinfecting fruits of *Strumeta* (*Dacus*) *tryoni.*

m Furr, J. R.
Observations on citrus growing in Spain and Italy during a trip to obtain citrus seeds.
J. Rio Grande Valley hort. Soc., 1957, **11**: 51-8, illus.

n Garangeat, S.
Les agrumes au Maroc. **(Citrus in Morocco.)**
Terre maroc., 1957, **31**: 210-15, illus.
Regions, varieties and production.

o Gómez Herrera, C., and Janer del Valle, C.
Problemas físico-químicos en la extracción del aceite de oliva. **(Physico-chemical problems in the extraction of olive oil.)**
Rev. Cien. apl., 1957, **11**: 97-103, bibl. 11.

p Grierson, W., and Hayward, W. F.
Fumigation keeps fresh citrus fruit moving.
Sunshine St. agric. Res. Rep., 1957, **2**(1): 6.
Problems and research on use of EDB against Mediterranean fruit fly in Florida.

q Gunther, F. A., and Blinn, R. C.
Ultraviolet spectrophotometric microdetermination of the acaricide 4,4′-dichloro-alpha-(trichloromethyl)-benzhydrol (FW-293).
J. agric. Food Chem., 1957, **5**: 517-19, bibl. 5.
In citrus peel extracts.

r Icart, A.
El bicho de cesto en Río Negro. **(The citrus bagworm in Río Negro.)**
Idia, 1956, Nos. 106/8, p. 68.
Oiketicus kirbyi and its control by parasites.

s KALMAR, A. F.
Cleaning of citrus fruit.
Citrus Leaves, 1957, **37**(8): 20-1.
Methods summarized.

t KNORR, L. C., AND REITZ, H. J.
Re-appraising citrus rootstocks, with particular reference to their susceptibility to virus diseases. II. Rangpur lime.
Citrus Mag., 1957, **19**(12): 14-15, 20, 22-5, bibl. 7, illus.
A review, with particular reference to "Rangpur lime disease" [see also *H.A.*, 27: 2786].

u LAMPTON, R. K.
Floral morphology in *Asimina triloba* Dunal. I. Development of ovule and embryo sac.
Bull. Torrey bot. Cl., 1957, **84**: 151-6, bibl. 6, illus.
The North American papaw.

v LEWIS, H. C.
Combining biological and chemical control for citrus pests.
Calif. Citrogr., 1957, **42**: 270, 286-8.
Services available to growers and experience in California.

w MANEFIELD, T.
The control of common pests of citrus in inland irrigated orchards of southern Queensland.
Qd agric. J., 1957, **83**: 125-31, illus.
Spray recommendations.

x DI MARTINO, E.
Le chiocciole nocive agli agrumi. **(Snails as pests of citrus.)**
Riv. Agrum., 1957, **2**: 37-43.
Theba pisana and *Helix aperta* and their control.

y MAXWELL, N. P.
1956 report of the [Texas] Experiment Station avocado test plot.
J. Rio Grande Valley hort. Soc., 1957, **11**: 79-80.
The most promising among 62 selections under trial described.

z METCALF, R. L., AND OTHERS.
The systemic behaviour of *O,O*-diethyl *S*-2-(diethylamino)ethyl phosphorothiolate and its salts.
J. econ. Ent., 1957, **50**: 205-10, bibl. 8, illus.
Tracer studies on lemon and cotton plants.

3893.

a MONTENEGRO, H. W. S.
Contribução para o estudo pomológico do abacateiro. **(Contribution to the pomological study of the avocado tree.)** [English summary 8 pp.]
Thesis Esc. sup. "Luiz de Queiros", Univ. São Paulo, Piracicaba, 1956, pp. 92, bibl. 30, illus.
Including very detailed descriptions of 8 varieties grown in São Paulo.

b REICHERT, I., AND BENTAL, A.
Additional tristeza-infested citrus varieties found in Israel.
FAO Plant Prot. Bull., 1957, **5**: 129-30, bibl. 4.
Six mandarins, 1 sweet orange and 1 grapefruit, all introduced from overseas.

c REUTHER, W.
Minor elements in relation to citrus and avocado production.
Calif. Citrogr., 1957, **42**: 327-30.
Current practices summarized.

d SMIRNOFF, W. A.
Aonidiella aurantii Mask (pou rouge de Californie). **(*Aonidiella aurantii*, the California red scale.)**
Fruits et Prim., 1957, **27**: 47-55, bibl. 13, illus.
Biology and control.

e SMITH, R. J., AND NAJIMA, H.
Rapid pack of oranges.
Calif. Citrogr., 1957, **42**: 340, 345, bibl. 1, illus.
An improved layout for carton packing, now the subject of a time and motion study.

f STANLEY, W. L., AND VANNIER, S. H.
Analysis of coumarin compounds in citrus oils by liquid-solid partition.
J. Ass. off. agric. Chem. Wash. 1957, **40**: 582-8, bibl. 6.

g TARJAN, A. C., AND FORD, H. W.
An aceto-osmium method for demonstrating nematodes in citrus roots.
Stain Tech., 1957, **32**: 171-4, bibl. 5, illus.
A staining and bleaching procedure for feeder roots [see also *H.A.*, 27: 2828m].

h TRIPPI, V. S., AND OSTE, C. A.
Líneas nucelares en citrus. Una revisión sobre su comportamiento. **(Nucellar strains in citrus. A review of their behaviour.)**
Rev. indust. agríc. Tucumán, 1956, **40**: 65-72, bibl. 22, illus.

i WEST, J. A.
Recommended changes in recovery techniques for burrowing nematode.
Plant Dis. Reptr, 1957, **41**: 600-2, bibl. 1.
A water incubation method applied to *Radopholus similis* in citrus roots.

j WOUTERS, O. D.
Cualidades agrícolas y comerciales en variedades de olivo. **(Horticultural and commercial qualities in olive varieties.)**
Idia, 1956, Nos. 106/8, pp. 88-9.
Pollen compatibility of olive varieties in Argentina.

k YEE, W.
The lychee in Hawaii.
Ext. Circ. Hawaii agric. Ext. Serv. **366**, 1957, pp. 13, bibl. 8, illus.
Varieties, culture including girdling, and pest control.

TROPICAL FRUIT AND PLANTATION CROPS.

General.

(*See also* 3089x, 3996 l, z, 4005, 4015, 4017, 4020-4022, 4026, 4029h, o, q, s.)

3894. Purseglove, J. W.
History and functions of botanic gardens with special reference to Singapore.
Trop. Agriculture Trin., 1957, **34**: 165-89, bibl. 16, illus.

The history of Singapore Botanic Garden, which was founded in 1822, is related, followed by a discussion of the functions of such gardens, which the author considers to be: (a) the maintenance of a collection of living plants and a herbarium, (b) the collecting and naming of specimens, (c) the undertaking of taxonomic studies, (d) the exchange of planting material, and (e) the breeding of plants. A certain amount of advisory work and the sale of plants may also be done, and the maintenance of a reference library is desirable. J.R.L.

3895. N.S.W. Department of Agriculture.
Australian tropical fruits—their nutritive value.
Agric. Gaz. N.S.W., 1957, **68**: 194-7, bibl. 10, illus.

A descriptive list of 16 Australian tropical fruits with a table showing their chemical composition, vitamin content and energy value. J.R.L.

3896. Calton, W. E., and Vail, J. W.
Micro-nutrient problems in Tanganyika. [German and French summaries 7 lines each.]
Reprinted from *VIe Congr. int. Sci. Sol Paris 1956*, pp. 5, bibl. 2.

Dieback of coffee was associated with low Ca and relatively high Mn uptake, but was not cured by improving the Ca status in the field. It was later eliminated almost completely by sprays containing B and Zn. Pot tests on Ca/Mn relations of coffee are proceeding. Wattle (*Acacia mollissima*) did not develop dieback when sprayed with solutions of B, whereas 32·5–47% of unsprayed trees were affected and manuring with ammonium sulphate appeared to increase the incidence of the disease. Leaf analysis of pyrethrum in an area of reduced productivity showed lower values for all essential elements, except N and S, than in plants from a fertile soil. Detailed investigations are being made.—Govt. Chem. Dep., Dar es Salaam.

3897. Steiner, L. F.
Field evaluation of oriental fruit fly insecticides in Hawaii.
J. econ. Ent., 1957, **50**: 16-24, bibl. 13.

Promising insecticides for control of the oriental fruit fly (*Dacus dorsalis* Hendel) were evaluated in 26 field experiments involving more than 180 tests on more than 600 plots from 1950 to 1955. The tests were conducted in Hawaii principally on mango, banana, guava, and papaya. Best results were obtained with bait sprays containing parathion or malathion wettable powders and certain enzymatic or acid protein hydrolysates. Where parathion bait sprays were applied at 2-week intervals, infestation reductions of 93 to 100% were obtained in 13 of 21 tests at rates of only $\frac{1}{5}$ to 2 lb. of parathion per acre. Malathion bait sprays were only slightly less effective. On the basis of these and other experiments, the protein hydrolysate-parathion or -malathion bait sprays and methyl eugenol-pyrolan bait stations are recommended for use in any large-scale control or eradication campaign. [From author's summary.]

Bananas.

(*See also* 3997a, b, l.)

3898. Pessanha, M.
Estudos sobre a cultura da bananeira. **(Studies on banana culture.)** [French and English summaries 9 lines each.]
Agron. angol., 1956, No. 10, pp. 15-28.

From a collection of clones of *Musa cavendishii*, *M. sapientum* and *M. paradisiaca* established at Cazengo, Angola, data are recorded on precocity of bearing, vegetative growth, yield, fruit characters and length of period from flowering to harvest. *M. cavendishii* could be harvested all the year round, with peak harvest periods in June and November.

3899. Freiberg, S. R., and Payne, P.
Foliar absorption of urea and urease activity in banana plants.
Proc. Amer. Soc. hort. Sci., 1957, **69**: 226-34, bibl. 10.

Urea, labelled with C^{14}, was applied, alone and with bordeaux mixture, to banana leaves by painting or spraying, using concentrations of 0·5 and 0·75%. Under humid conditions as much as 65% of the applied urea was absorbed within 25 minutes, and even under dry conditions up to 62% was absorbed within 24 hours. The lower surface of the leaf absorbed urea more rapidly than the upper surface which contained fewer stomata. When leaves were kept in continuous light little or no translocation occurred, but under conditions of alternate light and darkness radioactivity in the leaf declined to one half in 15 hours and to one quarter in 144 hours. Little, if any, urea was hydrolyzed within the banana leaf, and it would appear that hydrolysis only occurred in the growing point, the only vegetative region of the plant in which urease activity was detected. From the growing point the radioactive component of the urea was translocated to the youngest leaves. The fate of the nitrogenous component was not determined.—United Fruit Co., La Lima, Honduras.

3900. Rishbeth, J.
***Fusarium* wilt of bananas in Jamaica. II. Some aspects of host-parasite relationships.**
Ann. Bot. Lond., 1957, **21**: 215-45, bibl. 47.

Gros Michel has shown marked resistance to wilt (*Fusarium oxysporum* f. *cubense*) when grown in an alkaline soil of medium to heavy texture and rich in available potash. Nitrogen fertilizing has tended to increase susceptibility to wilt. Wilt generally shows a temporary decrease in dry weather, but an increase after heavy rainfall. Prevailing practices in banana growing have often led to soil deterioration and thus to increased wilt incidence. The possible mode of action of various factors on wilt incidence is discussed, and the importance of vigorous root growth in promoting host resistance is emphasized.—W.I. Banana Res Scheme, Jamaica. [For part I see *H.A.*, 25: 4348.]

3901. Subrahmanyan, V., and others.
Studies on banana pseudostem starch: production, yield, physico-chemical properties and uses.
J. Sci. Food. Agric., 1957, **8**: 253-61, bibl. 4, illus.

The presence of considerable quantities of starch in the banana pseudostem has been demonstrated for the first time. Evidence is presented to show that the starch content of the stems varies and is influenced by the variety, locality, stage of growth [in relation to inflorescence and bunch development], physiological state of the plant and climatic conditions, and particularly by the moisture content of the stems. The desirability of screening varieties with a view to selecting consistent yielders has been emphasized. The process evolved for the manufacture of banana pseudostem starch is outlined and physico-chemical properties of the starch are described. The starch can be used for industrial and edible purposes in place of ordinary starches. [From authors' abstract.]—Centr. Food. tech. Res. Inst., Mysore.

Cacao.

(*See also* 3089p, 3948, 3996c, d, h, i, o-q, 3997c, 4028.)

3902. W.A.C.R.I.
Proceedings of the Cacao Breeding Conference, 1956.
[*Publ.*] *W. Afr. Cocoa Res. Inst.*, 1957, pp. 49, bibls., 7s. 6d.

In a series of short papers members of the W.A.C.R.I. staff outline and discuss the progress so far made with regard to resistance and tolerance to virus and black-pod diseases, the breeding material assembled at W.A.C.R.I., breeding techniques including pollination, and agricultural requirements as breeding characters. The manufacturers' requirements as breeding characters are stated briefly by Dr. G. R. Howat. In conclusion Dr. G. D. H. Bell, who acted as chairman throughout the conference, and Dr. H. H. Rogers set out in some detail the main considerations and problems underlying the breeding work at W.A.C.R.I.

3903. Naundorf, G.
Desinfección des semillas de cacao. (**Cacao seed disinfection.**)
Cacao en Colomb., 1955, **4**: 55-7, bibl. 1 [received 1957].

In order to prevent disease development and reduction in germination capacity in cacao seeds during long transport, various seed treatments with mercurial fungicides were tested. Treatment with Arasan at 1 g. per kg. of seed, before packing the seed in powdered charcoal, increased the germination percentage and stimulated growth of the seedlings.

3904. de Verteuil, L. L.
Cacao cuttage in the Western Hemisphere.
Misc. Publ. Inter-Amer. Inst. agric. Sci., Turrialba, **8**, 1956, pp. 24+figs. 26, bibl. 15.

Since 1943/44, when the first station for producing clonal cacao plants from cuttings was constructed in Trinidad, propagating stations have been established in Costa Rica, Ecuador, Mexico and Surinam and in several British West Indian islands. By the end of 1955 they had between them produced some 9 million plants. In this publication the various systems adopted are described with the aid of plans and photographs and their relative merits and defects evaluated. Appendices deal with pests and diseases affecting propagation, construction and operating costs, small-scale and experimental propagating units, and present propagating capacity in the Western Hemisphere which is estimated to exceed 3 million plants per annum.

3905. Mora Contreras, L. A.
Estudios de las mejores mezclas hormonales para el enraizamiento de estacas de cacao. (**Studies on the best mixtures of growth substances for rooting cacao cuttings.**)
Agro (*Venezuela*), 1956, **10**(41): 49-57, from *Turrialba* (*Suppl. bibl.*), 1956, Vol. **6**, Abstr. 308/56.

Cacao cuttings treated with various growth substance mixtures were rooted in a Trinidad-type propagator. Growth substance treatment in general had greater effect on the growth and vigour of the roots than on the percentage of cuttings rooted. The mixture recommended by Alvim (indolebutyric acid and Phygon [see *H.A.*, 24: 4291 and 25: 2123]) gave the best results, having highly significant effects on root vigour and the general condition of the cuttings. The mixture recommended by Evans [see *H.A.*, 21: 1026 and 22: 4322] resulted in long roots but a low percentage of rooting. Seradix B-3 gave a high percentage of rooting and very vigorous but short roots.

3906. Ríos Vega, A.
La relación patrón-injerto en la propagación vegetativa del cacao (*Theobroma cacao* L.). (**The stock-scion relationship in vegetative propagation of cacao.**) [English summary ½ p.]
Cacao en Colomb., 1956, **5**: 73-83, bibl. 18.

Observations are reported on the early behaviour of scions of the cacao clones SCP5 and SCP6 budded on Calabacillo, Amelonado, Cundeamor, Angoleta and Criollo rootstocks. Cundeamor made the best growth before budding. Bud-take was highest on Calabacillo; it was also high on Cundeamor but lowest on Criollo. After 30 days scion growth was strongest on Amelonado, but after 60 days there was no difference in scion growth on the different stocks. Effects of the rootstocks at a later stage of growth have yet to be determined.

3907. Miller M., R.
Absorción de agua por la hoja de cacao. Nota preliminar. (**Water absorption by cacao leaves. Preliminary note.**)
Cacao en Colomb., 1956, **5**: 85-7, bibl. 4.

The average gain in weight of seedlings with 6 leaves from 12 moistenings of the entire leaf surface at 2-hr intervals was 5·37 g. per seedling.

3908. Vidal Suárez, M.
Transcurso de la brotación foliar en cacao durante un año. (**Sequence of leaf flushes in cacao in the course of a year.**) [English summary ½ p.]
Cacao en Colomb., 1955, **4**: 121-58, bibl. 6.

Leaf flushes were irregularly timed except in clonal material derived from cuttings. The average duration of a flush was about 30 days. Climatic factors showed no major effects.

3909. GIRALDO JARAMILLO, A.
Ciclo anual de la floración del cacao. **(Annual flowering cycle in cacao.)** [English summary ½ p.]
Cacao en Colomb., 1955, **4**: 159-74, bibl. 23.

In the Cauca valley, Colombia, cacao flowers almost continuously. Introduced varieties propagated by cuttings and grafts, however, have 2 peak flowering periods, i.e. April–July and November–January. In the case of introduced varieties propagated from seed the second peak is only slight. Native types propagated from seed have one flowering peak (April–August). Rainfall is the only climatic factor concerned. Leaf flushes are unrelated to periods of maximum flowering.

3910. ESQUIVEL CRUZ, S.
Influencia del boro sobre el crecimiento, desarrollo, polinización y fecundación del cacao. **(Effect of boron on the growth, development, pollination and fertilization of cacao.)** [English summary ¾ p.]
Cacao en Colomb., 1955, **4**: 63-83, bibl. 18, illus.

In 2-month-old cacao plants growing in nutrient solutions, growth was stimulated by a B range of 0·0003%–0·001%, and retarded by concentrations above 0·005%. Deficiency and toxicity symptoms are described. Treatment of stigmas and pollen with solutions containing B did not affect pollination or fertilization, but pollen-tube growth was stimulated in artificial media containing 0·0008%–0·001% of B and was inhibited above 0·005%.

3911. ARANGO ACERO, J.
Influencia del zinc sobre polinización y fecundación en cacao. **(Effect of zinc on pollination and fertilization in cacao.)** [English summary ¼ p.]
Cacao en Colomb., 1955, **4**: 85-120, bibl. 14, illus.

Treatment of stigmas with hanging drops of Zn solutions was abandoned in favour of injecting zinc sulphate solutions into the trunks. Fruit set was improved by injections of zinc sulphate at concentrations between 0·0025% and 0·05%, but concentrations of 0·2–2·0% were toxic. In no case did injected Zn affect germination or tube growth of pollen, but *in vitro* its effect was favourable at low. and adverse at high, concentrations. Besides inducing toxicity symptoms in leaves, excess of Zn produced dark radial stains in the wood, desiccation of pods of all ages and of floral cushions, and rendered stigmas non-receptive. Zinc fungicides are recommended for their nutritive value and for their stimulating effect on fruit set.

3912. NAUNDORF, G.
Nuevas contribuciones al estudio de la auto-incompatibilidad en cacao. II. **(Further contributions to the study of self-incompatibility in cacao. II.)**
Cacao en Colomb., 1955, **4**: 59-61, bibl. 1.

Moderate and strong self-compatibility, induced the previous year in self-incompatible trees by patch-budding with flower cushions of self-compatible trees [see *H.A.*, 25: 4359], was maintained. Similar results were obtained in a new series of experiments, 10 out of 53 self-incompatible trees producing normal self-pollinated fruit after patch-budding. Two completely sterile trees treated also produced normal flowers and pods. Three budded trees produced from their flower cushions abnormal long branches which completely lost their plagiotropic growth habit.

3913. RODRÍGUEZ RODRÍGUEZ, G.
Represión química de musgos, liquenes y una Bromeliacea en árboles de cacao, ornamentales e instalaciones eléctricas. **(Chemical control of mosses, lichens and a bromeliad on cacao trees, ornamental trees and electrical installations.)** [English summary 10 lines.]
Cacao en Colomb., 1955, **4**: 175-207, bibl. 7, illus.

Mosses, lichens and *Tillandsia* sp. on cacao, ornamental trees and telegraph posts were controlled more effectively and with less harm to the trees by chemical than by mechanical means. The best results were given by 0·05–0·1% DNOC ammonium salt, or 0·1–0·5% cuprous oxide or copper oxychloride, using 250 c.c. of solution per tree.

3914. IDROBO M., S., AND CARDEÑOSA B., R.
Grave epifitotia en Colombia causa el *Ceratostomella fimbriata* (E&H) Elliot en cacao (*Theobroma cacao* L.). **(Severe outbreak of disease on cacao in Colombia caused by *Ceratostomella fimbriata*.)**
Cacao en Colomb., 1956, **5**: 25-7, bibl. 10.

High susceptibility was found in the cacao varieties Criollo, Angoleta and Cundeamor. *Gliricidia sepium* var. *gigante* was susceptible, but the other shade trees investigated (*Erythrina glauca*, *E. poeppigiana*, *Pseudosamanea guachapele* amd *Inga vera*) were apparently immune. Inoculation of many other plantation crops and tropical fruit trees, including coffee and rubber, failed to produce the disease. The disease in cacao was transmitted by *Xyleborus* and Platypus spp. penetrating stem canker lesions caused by *Phytophthora faberi*.

3915. NAUNDORF, G.
La relación entre *Phytophthora faberi*, *Ophiostoma fimbriata* y *Xyleborus* sp. **(The connection between *Phytophthora faberi*, *Ophiostoma (Ceratostomella) fimbriata* and *Xyleborus* sp.)**
Cacao en Colomb., 1956, **5**: 35-6, bibl. 4.

The scolytid pest of cacao, *Xyleborus* sp., severely attacked trees infected with stem canker and apparently introduced the fungal parasite *Ceratostomella fimbriata*.

3916. NAUNDORF, G., IDROBO [M.], S., AND SANCLEMENTE, M.
Contribución a la lucha contra *Ophiostoma fimbriata*. Nota preliminar. **(Contribution to the control of *Ophiostoma (Ceratostomella) fimbriata*. Preliminary note.)**
Cacao en Colomb., 1956, **5**: 41-5, bibl. 12.

Foliar spraying of infected cacao trees with urea at 10–40 g. per l. considerably prolonged their life. Development of the disease was not checked by spraying with DNOC, hydroquinone, penicillin, terramycin, benzoic acid, methyl-p-oxybenzoic acid or umbelliferone, but was partially controlled by 8-oxyquinoline sulphate injected into trunks at 3·5–5 g. per l. The fungus alone did not kill trees rapidly, but death of untreated infected trees occurred in about 30 days when they were seriously attacked by the vector *Xyleborus*.

3917. IDROBO [M.], S., AND NAUNDORF, G.
Producción de toxinas por el *Ceratostomella fimbriata* en cacao. **(Production of toxins by *Ceratostomella fimbriata* in cacao.)**
Cacao en Colomb., 1956, **5**: 37-9, bibl. 7.

The presence of toxins in cacao bark and wood infected with *Ceratostomella fimbriata* was proved by the effects of extracts on tomato leaves. Urea sprays considerably retarded death of infected trees [see previous abstract], and it is suggested that this may have been due to the counteracting effect of urea on the toxin, an effect which has previously been demonstrated in the case of *Ceratostomella ulmi* (Dutch elm disease).

3918. GARCÍA [B.], C., AND NAUNDORF, G.
Observaciones sobre los cacaotales del Río Mira, con especial referencia a la enfermedad "escoba de bruja". **(Observations on cacao plantations of the Mira region, with special reference to witches' broom disease.)**
Cacao en Colomb., 1955, **4**: 5-9.

Conditions favouring the disease are described, with suggestions for its control. including selection of propagating material, seed disinfection with mercury salts, soil disinfection with DNOC and planting of protective barriers such as bananas.

3919. NAUNDORF, G.
Nueva contribución al problema de la moniliasis en cacao y su represión. **(Further contribution to the problem of monilia pod rot in cacao and its control.)**
Cacao en Colomb., 1955, **4**: 11-14, bibl. 3.

In a preliminary experiment, highly promising control was achieved in 10 weeks by 3 spray treatments of trees with a mixture of 1·5 kg. of a cuprous oxide product with 250 g. of a BHC product per 400 trees. [For earlier work see *H.A.*, 25: 4366.]

3920. SEPÚLVEDA LOZANO, R.
Biología del *Mecistorhinus tripterus* F. (Hem. Pentatomidae) y su posible influencia en la transmisión de la moniliasis del cacao. **(Biology of *Mecistorhinus tripterus* (Hemiptera, Pentatomidae) and its possible role in the transmission of monilia pod rot of cacao.)** [English summary ½ p.]
Cacao en Colomb., 1955, **4**: 15-42, bibl. 12, illus.

Pods inoculated with conidia of *Monilia roreri* were 28% diseased, but when *Mecistorhinus tripterus* bugs were placed on inoculated pods infection rose to 62%. Where bugs were used without conidia no pods developed the disease.

3921. HAMMOND, P. S.
Capsid control on mature cocoa.
New Gold Coast Fmr, 1957, **1**: 109-15.

Recommendations based on 2 years' field trials for capsid control in mature cacao are the application with a knapsack mistblower of 1 pint Gammalin 20 (gamma-BHC) in 5 gal. of spray per acre, this treatment being repeated after 4 weeks. Subsequent treatment need be of localized areas only. Marked improvements in yield have been obtained after treatment. DDT was much less effective than BHC, and dust and fog applications were less effective than mistblowing.

3922. RILEY, J.
A survey of the build-up of infestation in bagged cocoa beans in store in Western Nigeria.
Bull. ent. Res., 1957, **48**: 75-8, bibl. 2.

In bagged cocoa beans stored at Ibadan the population of *Ephestia cautella* remained low throughout the period but that of *Lasioderma serricorne* increased steadily from a low level at the outset. It is estimated that, in general, it would not be safe to store initially good cocoa for more than 25 weeks during the main crop season.—W. Afr. stored Prod. Res. Unit., Ibadan.

Coconuts.

(*See also* 3996s, 3997e.)

3923. CEYLON.
Annual Report for 1955 of the Coconut Research Institute, Ceylon.
Ceylon Coconut Quart., 1956, **7**: 4-67, illus.

Work described by the following heads of departments includes: *Soil Chemist:* High N continues to cause yield depressions, but in 2 trials P has given significant increases in yield; inorganic fertilizers have given higher nut yields than have several organic fertilizers. *Chemist:* Sand culture experiments with coconut seedlings; the relation between moisture content of copra and atmospheric humidity; examination of hybrid palm copra; coir dust as mulch to control immature nutfall. *Botanist:* Studies on the dwarf palm; intraspecific hybrids; size of seed-hole and growth of coconut seedlings. *Crop Protection:* Larvae of rhinoceros beetle were killed within 4 days by D-D soil fumigant or dieldrex; its biological control is also being studied.

3924. KOYAMU, K., AND ALBUQUERQUE, S. D. S.
Hints on the age of planting and spacing of coconut seedlings.
Coconut Bull., 1957, **11**(1): 11-12, 21.

In trials at the Coconut Research Station, Pilicode, started in 1925, higher yields per tree were obtained from trees planted when 1 year old than from those planted when 2 or 3 years old. There were also indications that wide spacing resulted in higher yields than close spacing, and planting 55–57 trees per acre is recommended. Early planting and close spacing both resulted in greater susceptibility to shoot-rot disease.

Coffee.

(*See also* 3039, 3896, 3996x, y, 3997a, f, q, u, 4022, 4028.)

3925. FRAGA, C. G., JR., AND CONAGIN, A.
Delineamentos e análises de experimentos com cafeeiros. **(Lay-out and analysis of coffee experiments.)** [English summary ½ p.]
Bragantia, 1956, **15**: 177-91, bibl. 3.

rocedures adopted at the Instituto Agronômico de ampinas are described for fertilizer and variety trials, rogeny tests and miscellaneous experiments. Results re quoted for spacing and planting methods, and the uestion of plot size for coffee experiments is discussed.

926. Bacchi, O.
Novos ensaios sôbre a seca da semente de café ao sol. **(Further experiments on sun-drying coffee seed.)** [English summary 8 lines.]
Bragantia, 1956, **15**: 83-91, bibl. 3.

oisture content and germination capacity were studied seed dried in sunlight, shade and artificially over lphuric acid. In every case viability remained nimpaired until the moisture content was reduced elow 9%. Sun-drying for 34 hours and shade-drying r 17 days each left just over 10% of moisture in the eeds under climatic conditions obtaining in S. Paulo early September. Seeds dried in the shade for 18 ays subsequently withstood 8½–10 hours exposure to nlight without significant loss of viability. Drying r 2 months over sulphuric acid was safe at R.H. 50% r higher, but at R.H. 40% there was a slight fall in ability after 1 month. [For previous paper see .*A.*, 26: 4164.]

27. van Haaren, A. J. H.
The vegetative propagation of *Coffea arabica* L.
Papua New Guinea agric. J., 1955, **10**: 43-53, bibl. 7, illus.

various methods of vegetative propagation tested arabica coffee at Aiyura, the following were most ccessful: (1) Single internode cuttings taken from atershoots during the dry season, and (2) cleft grafting ith scions taken from the middle section of the atershoot, partially or wholly defoliated, and grafted 1- to 2-year-old seedlings.

928. Scaranari, H. J.
Espaçamento das mudas de café na cova. **(Spacing of coffee seedlings in planting sites.)** [English summary ¼ p.]
Bragantia, 1956, **15**: 347-52, bibl. 5.

our 1-year-old plants raised from seed were spaced n the square 10, 20, 30 and 40 cm. apart in prepared tes each measuring 60 × 60 cm. × 50 cm. deep. Data overing the first 4 harvests show that plant height as greater from the two closer than from the two ider spacings and that yields increased in linear roportion to increase of spacing. Bean size was naffected by spacing.

929. Dublin, P.
Recherches sur la floraison et la fructification du caféier de la "Nana". **(Studies on flowering and fruiting of Nana coffee.)** [English and Spanish summaries 1 p. each.]
Agron. trop., 1957, **12**: 173-208, bibl. 57, illus.

oth morphologically and biologically Nana coffee ows marked similarities to *canephora* varieties, which ggests that it is a variety of this species. Among the any experiments described here it was found that ollen could be stored successfully for 9 months at -5° C. in the presence of magnesium chloride; pollen erminated readily on sugar media. Only 50% of the fertilized ovaries set fruit. In practice Nana plants appear to be completely self-sterile, although this may not be the case for all strains. Nana and Robusta were found to be completely inter-fertile.—Stat. agric. Boukoko.

3930. de Sampaio Barros, M., Jr.
Sombreamento e cafés finos. **(Shading and high-quality coffee.)**
Bol. Super Serv. Café, S. Paulo, 1957, **32**(359): 60-2.

Shading with *Inga* when replanting coffee bushes and pruning at the top and base of the bush for 3 successive years from the 7th onward gave high yields of excellent quality. When shade trees began to compete with the crop this was successfully overcome by cutting a trench 40–50 cm. deep between them and the coffee bushes. Shading greatly reduced pest infestation. Red and yellow *bourbon* types were easiest to grow under shade; *caturra* types needed more light and heat.

3931. Pessanha, M.
Contribuição para o estudo da relação entre a chuva e a produção do *Coffea canephora* Pierre. **(A contribution to the study of the relationship between rainfall and productivity of *Coffea canephora*.)** [French and English summaries 8 and 9 lines respectively.]
Agron. angol., 1956, No. 10, pp. 9-14, bibl. 5.

Data obtained during the period 1947–55 at the Central Agricultural Station, Cazengo, although insufficient for statistical treatment, suggested that there was a correlation between average yield of fresh coffee beans per tree and amount of rainfall in the previous season.

3932. Jones, P. A., and Wallis, J. A. N.
Irrigation experiments at the Coffee Research Station, Ruiru, Kenya.
E. Afr. agric. J., 1957, **22**: 186-7, bibl. 3, reprinted in *Mon. Bull. Coffee Bd Kenya*, 1957, **22**: 68, bibl. 3.

The lay-out of a long term factorial experiment to test the effect of applying irrigation at 4 different times by 2 methods on the vegetative growth, flowering, crop yield, pests and diseases of mature multiple stemmed coffee is described.—Dep. Agric., Kenya. J.R.L.

3933. Pereira, H. C.
The seasonal assessment of water needs in the irrigation of coffee.
E. Afr. agric. J., 1957, **22**: 188-93, bibl. 4, reprinted in *Mon. Bull. Coffee Bd Kenya*, 1957, **22**: 94-6, bibl. 5.

The soil moisture deficits (10-day calculations) in a plantation of arabica coffee are shown for the period 1950–56. An experiment at Ruiru has shown that when water is applied in small basins, about 4 ft. × 4 ft., the quantity needed to wet the greater part of the root zone is only about half that needed when water is applied by overhead sprinkler. Arrangements are being made, by which planters may submit rainfall data and be advised of the approximate soil moisture deficit.—E. Afr. Agric. For. Res. Org. J.R.L.

3934. Borget, M.
L'irrigation des caféiers par aspersion. **(Sprinkler irrigation of coffee.)**
Café, Cacao, Thé, 1957, **1**(1): 18-23, illus.

The practical aspects of using rotary sprinklers in coffee are discussed. Preliminary experimental results were not consistent, but flowering was improved by irrigation in some cases.—Stat. de Boukoko, Oubangui.

3935. Franco, C. M.
Descoloração em fôlhas de cafeeiro, causada pelo frio. **(Discoloration of coffee leaves by cold.)** [English summary 11 lines.]
Bragantia, 1956, **15**: 131-5, bibl. 10, illus.

Yellowish and whitish mottling observed in the field was reproduced by placing coffee plants in a refrigerator for different lengths of time after sunny and cloudy days. The symptoms appeared 3–7 days after treatment and included shrinkage and deformation. The youngest leaves were most severely affected, 6 hours at 3° C. being sufficient to produce symptoms, which were most marked when a clear sunny day preceded treatment.

3936. Mendes, H. C.
Possível causa do insucesso de se cultivar cafeeiros adultos em soluções nutritivas do tipo Hoagland. **(Possible cause of failure of adult coffee plants to grow in nutrient solutions of the Hoagland type.)** [English summary ¼ p.]
Bragantia, 1956, **15** (Suppl.): I-III, bibl. 10.

Plants grew satisfactorily in Hoagland's solution until 3–4 years old, when sudden decline and frequently death occurred at the onset of flowering. There is some evidence that at this stage the roots may become unable to utilize nitrites and nitrates, which become toxic, and that ammonium nitrate and potassium chloride should be supplied in place of potassium nitrate.

3937. Cibes, H., and Samuels, G.
Mineral-deficiency symptoms displayed by coffee trees grown under controlled conditions.
Tech. Pap. P.R. agric. Exp. Stat. Río Piedras **14**, 1955, pp. 21, bibl. 15, illus.

The effect of major and minor elements on growth and yield are discussed. Visual deficiency symptoms developed in sand culture are described and illustrated by colour photographs, and leaf analysis values are given for N, P, K, Ca, Mg, Fe, Mn, B and S.

3938. Molle, A.
L'alimentation minérale du caféier (*Coffea canephora* Pierre). **(Mineral nutrition of coffee (*Coffea canephora*).)**
Publ. Sér. sci. I.N.É.A.C. **69**, 1957, pp. 163, bibl. in text.

Coffee plants were grown in sand cultures to study the requirements of N, P, K, Ca, Mg and S and in some instances those of Cl and Na. Close correlation was found between fresh weight and dry weight and also between flower production and dry weight of vegetative material. The more satisfactory the nutrient supply and balance, the less was the variation between the plants. Nutrient unbalance was frequently more harmful than general deficiency. The N–P–K balance was not the most important feature of the nutrient supply. Optimal proportions of anions expressed as chemical equivalents (i.e. divided in each case by their valency) were: nitrate 42·2%, sulphate 21%, phosphate 18·9% and chloride 17·9%; or, in the absence of chloride, nitrate 38·3%, sulphate 43·7% and phosphate 18%. For cations the proportions were: K 22·8%, Ca 37·9%, Mg 33·9% and Na 5·4%; or, without Na, K 15·6%, Ca 52·2% and Mg 32·2%. Permissible ranges of variation are stated. The optimal anion/cation ratio was provisionally determined as 1·2–1·5. A fertilizer formula suggested for very poor soils is: 21·6% kieserite (82–83% $MgSO_4$), 12·9% triple superphosphate, 14% potassium sulphate, 3·4% potassium nitrate, 37·5% ammonium nitrate and 10·6% gypsum.

3939. Reis, A. J., and de Arruda, H. V.
Frutificação no cafeeiro. **(Fruit set in coffee.)** [English summary ½ p.]
Bragantia, 1956, **15**: 93-8, bibl. 4.

In plants receiving 0·2 kg. of bone meal and 10 kg. of farmyard manure per plot (9 hills), fruit set was 3·5% higher than in those receiving only farmyard manure. In a subsequent experiment with a basic application of 0·2 kg. each of ammonium sulphate and bone meal the effects of separate and combined additions of 10 kg of farmyard manure and 0·1 kg. of potassium chloride were studied. Fruit set was significantly raised by an average of 8·1% on manured plots, but K had no significant effect and there was no distinct interaction between K and manure [both Portuguese and English summaries attribute the 8·1% increase to K]. High branches showed a greater percentage of fruit set than those half way down or at the base of the plant. Final yield was not correlated with percentage fruit set.

3940. Malavolta, E., Arzolla, J. D. P., and Haag, H. P.
Absorption of urea sprays by coffee leaves under field conditions.
From abstr. in *Plant Physiol.*, 1957, **32** (Suppl.): xiv.

In experimental plots, in which symptoms of N deficiency were induced in young coffee plants by PK manuring, there was a high degree of absorption of urea from three 2·5% spray applications. These increased the leaf N content from 2·38% to 3·42% of dry matter. Compared with plants from NPK plots the urea treatment increased the leaf contents of asparagine and glutamic acid about 5-fold, but the quantities of other amino acids remained unchanged.—Univ. S. Paulo, Piracicaba, Brazil.

3941. Pérez, V. M., Chaverrí, G., and Bornemisza, E.
Algunos aspectos del abonamiento del cafeto con boro y calcio en las condiciones de la Meseta Central de Costa Rica. **(Some aspects of boron and calcium fertilizing of coffee under conditions of the central plateau of Costa Rica.)**
Inf. téc. STICA **1**, 1956, pp. 13, from abstr. in *Cenicafé*,* 1957, **8**(1): 8.

In factorial experiments with 3 levels each of B and C

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*Formerly *Biol. inf. Café, Chinchina-Caldas.*

ither leaf Ca nor yields were affected by Ca, but leaf B d yields rose in proportion to B application, the yield crease being 280% at the highest B level. Deficiency resholds in leaves were 1% for Ca and 50 p.p.m. for out the effects of B depended on the Ca/B ratio, which noted B toxicity at 60 or less, normality between and 400, and B deficiency between 400 and 2,500. the presence of adequate Ca, tolerance to B was high.

942. Barriga O., R.
Ensayo comparativo de fungicidas para control de la gotera del café, *Mycena citricolor* (Bert y Curt) Sacc. **(Experiment comparing fungicides for control of coffee leaf spot (*Mycena citricolor*).)**
Agric. Trop. Bogotá, 1957, **13**: 191-6, bibl. 4, illus.

oung potted plants of bourbon coffee were sprayed ith various fungicides at monthly intervals and kept tween treatments under bushes heavily infected with af spot (*Mycena citricolor*=*Stilbum flavidum* =*Omphalia flavida*]). Protective effects were assessed ter 2,4 and 6 months. Excellent results were given roughout by lead arsenate (4 lb./100 gal.). Good sults were given by 2–2–40 bordeaux mixture and by renox (3 lb./100 gal.). Captan, ferbam and ziram ere practically useless, Shell copper fungicides gave ght protection and Tropical Mortegg (a tar oil duct) caused leaf burn. Percentage defoliation s lowest with lead arsenate and only slightly higher th Perenox or bordeaux mixture. The promising sults given by lead arsenate will be followed up by d experiments and physiological tests for possible tritional disturbances.

943. Rodríguez, R. A., Bianchini, C. A., and Soto, C. A.
Studies on the control of "derrite" disease of coffee caused by *Phyllosticta coffeicola* Del.
Plant Dis. Reptr, 1957, **41**: 560-3, bibl. 3, illus.

laboratory tests, Emmi and Phix (both mercury mpounds), and Rimocidin were the 3 most effective ngicides tested, while Orthocide and Tuzet showed omise. In field trials Tuzet, Emmi and Orthocide ve almost complete control of the disease.—Minist. gric. Industr., Costa Rica.

44. Decelle, J.
Traitements phytosanitaires dans les plantations de caféiers Robusta. **(Plant-protection treatments in robusta coffee plantations.)**
Bull. Inf. I.N.É.A.C., 1957, **6**: 93-9, bibl. 5.

uantities of DDT and endrin for use in sprays and where suitable) mists against leaf-eating caterpillars *ichocrocis crocodora*, *Epicampoptera* spp., and *ephanodes hylas*) are tabulated. Leaf miners are ntrolled by parathion sprays, using 500 g. of active bstance in 1,000 l. per ha. For control of *Stephano- res hampei* data are tabulated on the use of endrin d different forms of BHC and lindane. The trunk rer *Bixadus sierricola* is best controlled by injecting 5% lindane and sealing the treatment punctures. lternative treatment is the painting of trunks with 5% dieldrin emulsion. Various ant species are ntrolled by sprays of 0·5% chlordane or with 0·1% aldrin, dieldrin or γ-BHC. Dusting is usually rather less effective. Scale insects need repeated spraying with 1% white oil mixed with 0·05% parathion. The bug *Habrochila placida* is resistant to DDT which kills its predator *Appolodotus distanti*, but can be controlled by spraying the under surfaces of leaves with 250 g. parathion, 500 g. malathion or 400 g. diazinon per ha. Good results are also given by γ-BHC or endrin as used against *Stephanoderes*. Damping-off, caused by *Rhizoctonia solani*, is prevented by treating seedbed soil with ethyl mercuric chloride in 0·5% solution and curative treatments are carried out with 1% copper products or 0·2% organic mercury compounds. Copper fungicides are effective against various leaf spotting diseases common in nurseries, and copperized zineb at 0·5% is used against *Corticium salmonicolor*.

3945. Le Pelley, R. H.
A survey of coffee entomological problems: Kenya 1956-1957.
Mon. Bull. Coffee Bd Kenya, 1957, **22**: 92-3.

Notes are given on the occurrence, present methods of control and suggested lines of research on mealybugs (*Planococcus kenyae*), leaf miners (*Leucoptera coffeella* and *L. caffeina*), tip borers (*Eucosma nereidopa*), antestia (*Antestiopsis* spp.), white borers (*Anthores leuconotus*), thrips (*Diarthrothrips coffeae*), asterolecanium (*Asterolecanium coffeae*), lace wing bugs (*Habrochila placida*), green scale (*Coccus africanum*), and chafers and other soil insects in nurseries and young plantings.—Dep. Agric., Kenya.

3946. González Mendoza, R.
La hormiga "minadora" del cafeto. **(The coffee borer ant.)** [English summary ⅓ p.]
Rev. Cafet. Colombia, 1957, **13**: 117-21, bibl. 3, illus.

The ants (*Myrmelachista* sp.) attack coffee trees through open wounds caused during pruning or picking. They tunnel through the xylem and part of the phloem and rapidly kill the tree. Among various insecticides and methods of application tested for control the best results were given by 1% aldrin emulsion sprayed on the trunks and branches containing ant colonies. This controlled the ants and protected the trees for more than 18 months.

3947. Carvalho, A.
Investigações sôbre o preparo do café. **(Investigations on coffee processing.)**
Estado de S. Paulo, 24th Oct., 1956, repr. in *Bol. Super. Serv. Café, S. Paulo*, 1957, **32**(359): 64-5.

Information is given on the time required for drying coffee in berries harvested at different stages from green to mature and shrivelled. At 40° C. this ranged from 90 hr. to only 5 hr. Coffee gathered regardless of ripeness should be sorted before drying. Drying was twice as rapid at 40° C. as at 30° C. Preliminary experiments indicated that temperatures above 30° C. reduced liquoring quality.

3948. Sauda, —.
Étude sur le stockage des cafés et cacaos à Douala. **(A study on the storage of coffee and cacao beans at Douala.)**
Café, Cacao, Thé, 1957, **1**(1): 10-17, illus.

With a moisture content below 13% for coffee and 8% for cacao beans there is little danger of mould development during storage. These moisture contents may be maintained in atmospheres of 75% relative humidity for coffee and 73% for cacao. The effect of diurnal variations in humidity on moisture uptake by coffee beans was studied. When the relative humidity remained below 75% for 11% or more of the day the moisture content of the beans remained at 13%; when this relatively dry period lasted for more than 16% of the day the beans began to lose moisture. Precautions for maintaining the desired humidity during the rainy season are described, as are methods for artificial drying.

Mangoes.

(*See also* 3101, 3997j, n.)

3949. Singh, S. M.
Control of *Drosicha stebbingi* var. *octocaudata* Green.
Curr. Sci., 1957, **26**: 92, bibl. 4.

In trials using several insecticides the mango mealy bug (*Drosicha stebbingi* var. *octocaudata*), which also attacks peach, plum, citrus, papaya, etc., was eradicated by 20% diazinon emulsifiable concentrate diluted to 1 : 600 applied during the last week of March.—Govt Fruit Res. Stat., Saharanpur. J.R.L.

Oil palms.

3950. Broeshart, H., Ferwerda, J. D., and Kovachich, W. G.
Mineral deficiency symptoms of the oil palm.
Plant and Soil, 1957, **8**: 289-300, bibl. 11, illus.

In sand culture experiments young oil palms deprived of N had uniformly yellowed leaves, those lacking K showed marginal yellowing and those lacking Mg developed orange chlorosis. All showed poor growth. In field experiments the Mg and K deficiency symptoms were reproduced and, by omitting B, little-leaf disease was induced. Yellowing of young leaves, interveinal chlorosis and necrosis resulted from S deficiency. Formation of inflorescences was checked by deficiencies of N, K, Mg or B. Plant failure disease was associated with Mg deficiency and poor root systems, sometimes following little leaf. A further type of this disease appeared to result from extreme K deficiency. No evidence was found for attributing confluent orange spotting to K deficiency.—Res. Dep., Huilever S.A., Yaligimba, Belgian Congo.

3951. Haines, W. B.
Oil-palm experiments.
A.R. Rothamsted exp. Stat. 1956, 1957, p. 49.

Bunch weight dropped abruptly when manuring ceased after many years, but bunch number was unaffected. The effect of K declined gradually at a rate similar to that at which it has been built up. Bunch number was reduced by P in a dry season and increased by it in the early part of a wet one, but K increased bunch number late in the wet season and in the following dry season. Root growth was markedly stimulated by P. Where K was deficient P had no beneficial action. Where high competition between palms is suspected, increased manuring of the poorer palms may prove more economic than concentrating manures on the high yielders.—Rothamsted exp. Stat. [See also *H.A.*, 26: 4181.]

3952. Prevot, P., and Ziller, R.
Étude d'une carence en potasse et en azote sur palmier à huile au Dahomey. **(Study of a deficiency of potassium and nitrogen in oil palms in Dahomey.)**
Oléagineux, 1957, **12**: 369-76, bibl. 5.

The main deficiency was of potassium. Application of adequate K not only corrected this, but substantially reduced the secondary N deficiency, both results being confirmed by leaf analysis and yield increases. Leaf K was increased as a residual effect of green manuring. The ratio of water content to dry matter in leaves was increased by K manuring and this was advantageous in a low-rainfall region. Details are given of correlations of leaf N, P, K, Ca and Mg with each other and with yields, showing considerable differences among varieties. Manuring the intercrop vegetables with K and N is suggested.—I.R.H.O.

Rubber trees.

(*See also* 3996a, e, 3997k, o, r, s.)

3953. Anon.
RRIM '600' series clones.
Plant. Bull. R.R.I.M., 1957, No. 30, pp. 41-50, illus.

Growth, disease incidence, initial yields and other characters are recorded from large scale trials of RRIM 600 series clones. To date the most promising clones are RRIM 600, 603, 605, 607, 610, 612, 613, 614 and 615.

3954. d'Angremond, A.
Seed gardens.
Arch. Rubbercult., 1957, **34**: 55-95.

In this draft the late author discusses the merits of bi, tri- and polyclone seed-gardens. Preference is given to polyclone seed-gardens. Eight clones are recommended for planting in seed-gardens: AV 152, AV 161, AV 163, AV 308, AV 317, AV 321, AV 374, Pil B84. In view of the close relationship which exists between AV 161 and AV 317, these two clones should not be planted together in the same seed-garden. As they are probably of the same value as breeding parents, either AV 161 or AV 317 may be used with the six other selected clones. Cantly's equilateral triangle system of obtaining an ideal mixed stand of the buddings of the seven selected clones is accepted. Seed-gardens for producing seed for stock material, e.g. *Hevea brasiliensis*=*H. spruceana*, are not discussed.

3955. Bolle-Jones, E. W.
Visual symptoms of mineral deficiencies of *Hevea brasiliensis*.
J. Rubb. Res. Inst. Malaya, 1956, **14**: 493-579, bibl. 2, illus., being *Commun.* **300**.

An account is given of the visual symptoms of N, S, P, Mg, K, Ca, Fe, Mn, B, Cu, Zn and Mo deficiencies produced in hevea seedlings grown in sand culture. The symptoms are briefly described and illustrated in ck-and-white and colour. Some interesting cases of ociation between fungal diseases and nutrient us are noted. Tables are appended showing the ct of the various deficiencies on height, girth and production of the plants and chemical composition he leaves.

6. Evers, E.
Rationalisation de la saignée et de la récolte dans une plantation d'hévéas. **(Rationalization of tapping and collection in a rubber plantation.)**
Bull. Inf. I.N.E.A.C., 1957, **6**: 69-86.

tapping system S/2 M/2 (half the trunk circumnce tapped in alternate months) gave higher latex ds, more economic use of cups, less bark cutting less coagulation than the traditional S/2 D/2 em involving tapping on alternate days. At rent labour costs the system S/2 M/3 was more fitable in low-yielding and very young plantations n S/2 M/2, although the latter generally gave higher ds. Equations are given for determining the relafinancial advantages of the 3 systems, using rubber es, production and cost of labour. The more ctive utilization of labour is discussed. The flow atex decreases slightly between 4 a.m. and 7 a.m. more markedly from 7 a.m. to midday.

7. Resing, W. L., and Lunshof, H. J.
Properties of centrifuged latex from young trees.
Arch. Rubbercult., 1957, **34**: 97-114, bibl. 25.

examination of concentrated latex from young es tapped for the first time over the course of half ear including the wintering period revealed no desirable qualities in the latex. In the early period hanical and chemical stability is high but this is so during wintering. The significance of test hods for concentrated latex is briefly discussed.

Sugar cane.

e also 3996b, g, j, k, r, t, v, w, 3997g-i, m, p, t, 4013.)

8. South African Sugar Journal.
The South African sugar year book 1955-56, South African Sugar Journal, 44 Stability Buildings, Smith Street, Durban, 10½×8½ in., pp. 272, illus., 10s. (post free).

year book contains informative articles and rts on the progress of the South African sugar ustry in the past year, but in contrast to previous ions it does not include the Annual Report of the ar Association Experiment Station, which has been lished separately. Other articles describe the sugar ustries in Mauritius, East Africa and India.

9. Mauritius Sugar Industry Research Institute.
Annual Report of the Mauritius Sugar Industry Research Institute, 1956, pp. 92+xxii, bibls, illus., also summarized in French in *Rev. agric. sucr. Maurice*, 1957, 36: 68-101.

eral of the research reports have been abstracted arately below. Other work described in this report udes the application of chemical fertilizers, ratoon stunting disease [see also *H.A.*, 27: 2949], trash disposal and preliminary studies with overhead irrigation apparatus.

3960. Burr, G. O., and others.
The sugarcane plant.
Annu. Rev. Plant Physiol., 1957, **8**: 275-308, bibl. 256, illus.

In this review the authors examine work on the growth habit of sugar cane and its composition, mineral nutrition, carbohydrate metabolism and flowering, and discuss in some detail the responses of the crop to temperature, light and water supply.

3961. Brett, P. G. C.
Developments in cane breeding and present variety position.
S. Afr. Sugar J., 1957, **41**: 355-9, 363, bibl. 1.

Investigations have shown that only a very few cane seedlings are capable of giving higher yields than present commercial varieties and that there is no satisfactory way of distinguishing these at the single-stool stage from the much larger number of seedlings which approach the commercial varieties in yielding capacity. It is concluded that it would be better to extend facilities for testing an increased number of seedlings at the later stages of selection rather than to raise the standard of selection at the single-stool stage or to increase the number of seedlings raised each year above the present figure of about 40,000. Among varietal changes it is expected that the older Co. varieties will be steadily replaced by N:Co.376 and other new N:Co. varieties.

3962. de Sornay, A.
Cane breeding in 1956.
A.R. Mauritius Sugar Ind. Res. Inst. 1956, pp. 20-30.

The behaviour of M.129/43, M.147/44 and M.31/45 in pre-release variety trials has been finally summarized and their characteristics are described. Promising varieties from other trials are M.202/46, M.93/48, and M.253/48. Ratooning trials showed that M.129/43 ratoons as well as M.134/32 and that M.147/44 and M.31/45 have a higher ratooning capacity particularly under very humid and irrigated conditions.

3963. Jayasekera, E. W. H.
Techniques of seed and seedling production with sugar cane.
Trop. Agriculturist, 1956, **112**: 262-6.

Studies started at Polonnaruwa, Ceylon, in 1951 were devoted to the following questions: principles of mating, flower dehiscence and pollen discharge, technique of controlled crossing and seed production, method of seed storage, technique of seed germination and seedling selection. Preliminary indications deduced from results to date are here discussed.

3964. Segalla, A. L., and Alvarez, R.
Ensaios de variedades de cana de açúcar. I. Série de ensaios realizados no período de 1951 a 1954. **(Sugar-cane variety trials. I. Series of trials carried out from 1951 to 1954.** [English summary ½ p.]
Bragantia, 1956, **15**: 373-92, bibl. 10.

From the results of 4 trials Co.290, Co. 419 and C.B.36/14 are highly recommended for São Paulo.

Brazil. On fertile soils Co.421 and Co.413 may also be satisfactory.

3965. Tabayoyong, F. T., and Victoria, H. P., Jr.
Dipping cane points in systemics.
Sugar News, 1957, **33**: 172-4, 177.

Dipping sugar cane setts for 30 mins. into 4·7 ml. per gal. solutions of American Cyanamide 3911, American Cyanamide 12008, Pestox III, Pyrazoxon and Systox gave good reduction in infestations of dead-heart borers, stalk borers, eye borers, scale insects and pink mealybugs. Certain materials were more effective against some insects than others; in an overall assessment the best results were given by American Cyanamide 3911 followed by Pestox III. All the treatments increased cane and sugar yields compared with the controls, the highest yield of cane being produced by Pestox III and that of sugar by American Cyanamide 3911.

3966. Samuels, G., Alers Alers, S., and Landrau, P., Jr.
A comparison of different leaf-sampling techniques used in the foliar diagnosis of sugarcane in different countries.
J. Agric. Univ. P.R., 1957, **41**: 1-10, bibl. 8.

Four different methods were compared. The sampling methods used in Hawaii, British Guiana and Mauritius gave similar values for N, P, K and moisture. The Puerto Rican method, in which the leaf midrib is used as well as the lamina, gave lower N and P values and higher K values. There was no appreciable variation in the N content of individual leaves from No. 3 (Kuijper's No. +1) to No. 6 (+4), but P, K and sheath moisture declined with increasing leaf age. When conversion factors were applied to standardize values for the various countries and techniques the optimum leaf-nutrient values showed satisfactorily close agreement.

3967. Halais, P.
Nutrition and soils. 4. Foliar diagnosis.
A.R. Mauritius Sugar Ind. Res. Inst. 1956, pp. 47-9, bibl. 2.

Foliar and basal internode diagnoses were used and compared in 3 trials. In trials on 6 varieties the P_2O_5 content in the basal internode dropped when increased N fertilization resulted in increased absorption. No differences in plant analyses were shown by either method of diagnosis after the application of factory residues to the crop.

3968. de Aguirre, J. M., Jr., and others.
Resultados de ensaios de adubação em cana de açúcar. **(Results of sugar-cane fertilizer trials.)** [English summary ½ p.]
Bragantia, 1956, **15**: 27-34, bibl. 7.

Pre-planting applications of 0, 30, 60, 90 kg. per ha. of P and K, as superphosphate and potassium chloride respectively, were factorially combined with O and 30 kg. per ha. of N as cottonseed meal for the sugar-cane variety Co.290. On all 3 soils involved the 30 kg. of N increased yields significantly. On *terra roxa legítima* [true terra rossa?] soil 60 kg. of P was practically equal to 90 kg. in increasing yield and K made little difference, but on *terra roxa misturada* [mixed terra rossa?] the highest rate was best for bot P and K. On a sandy soil 90 kg. of P and 60 kg of K gave satisfactory results.

3969. Elías, J.
La fertilización en los cultivos de caña de azúcar. **(Manuring sugar cane crops.)**
Idia, 1956, Nos. 106/8, pp. 293-4.

At the Villa Alberdi Experimental Station, Argentina cane yield was increased by N and sucrose content b K. Vegetative growth and leaf colour were bette with ammonium sulphate than with Chilean nitrate Response was slight with 30 kg. of N per ha. bu marked with 60 or 90 kg.

3970. Vallance, L. G.
Farm fertilizer trials. Results of the 1956 season.
Cane Grs' quart. Bull., 1957, **20**: 109-16, illus.

In a series of trials in Queensland prilled (granulated urea was shown to be as effective as sulphate o ammonia as a top-dressing for plant and ratoon cane The cost of urea based on units of N was lower tha that of sulphate of ammonia.

3971. Humbert, R. P., and Ayres, A. S.
The use of aqua ammonia in the Hawaiian sugar industry. II. Injection studies.
Proc. Soil Sci. Soc. Amer., 1957, **21**: 312-16, bibl. 8, illus.

Aqua ammonia injected into acid or neutral clay soil showed small losses from volatilization compared wit those from surface application. Applications wer made at 60–200 lb. of N per acre. These greatl improved N utilization by the crop by retardin nitrification and thus reducing losses from leaching Sugar-cane roots were slightly discoloured, but otherwise unharmed, where the rate of injection was 1,50 p.p.m. of N, and subsequent root development wa much more vigorous than in untreated controls. Clos placement and heavy application were profitable i acid and neutral soils, but lighter and more frequen applications were necessary in coarse-textured alkalin soils.

3972. Parish, D. H.
Nutrition and soils. I. The composition of cane juice.
A.R. Mauritius Sugar Ind. Res. Inst. 1956, pp. 31-7, bibl. 8.

Six sugar-cane varieties were grown at 3 levels of N and with optimum P and K in high and low rainfal plots. Juice contents of K_2O, MgO and CaO varie according to variety. In high rainfall plots the minera status of the juices was lower than in the drier plots Increasing N levels only depressed K_2O and P_2O contents when yields were also increased.

3973. Rao, M. S. S., Prasad, R. B., and Khanna, K. L.
On the influence of sulpha drugs in sugar-cane.
Proc. Indian Acad. Sci., Sect. B, 1957, **45**: 225-33, bibl. 22, illus.

Five sulpha drugs at 3 concentrations were applie to young sugarcane sets. All drugs induced chlorosis degree being directly proportional to the dosage. th root and shoot growth were retarded by drug plication. Most of the drugs induced the formation a mass of undifferentiated tissue at the lower nodes h a few distinct bud forms, which later sprouted to m healthy tillers. The compounds tended to prove the number of healthy tillers per clump, the st successful results being obtained with sulpharazine and sulphathiazol at 184 p.p.m. The weight canes per clump decreased with increasing drug ncentration. There was no apparent effect on juice ality.—Centr. Sugarcane Res. Stat., Pusa, Bihar. or earlier work see *H.A.*, 27: 925.]

74. RAO, M. S. S., AND OTHERS.
Use of growth inhibitors in maintaining high sugar recoveries in late season.
Curr. Sci., 1957, **26**: 116-17, bibl. 8.

leic hydrazide and Terpineol sprays, both at ious concentrations ranging from 100 to 700 p.p.m., re applied to 4 sugar cane varieties at 60 gal./acre, d milling tests were carried out at various times m 4 to 36 days after spraying. In every case the ment resulted in a substantial increase in sugar overy, the range of improvement being 0·32 to 0% for MH and 0·73 to 1·70% for Terpineol.—ntr. Sugarcane Res. Stat., Pusa, Bihar.

5. BARRIE, A. G.
The sugar content of cyclone damaged Pindar.
Cane Grs' quart. Bull., 1957, **20**: 140-1.

x readings were made at fortnightly intervals in one-damaged and sound stalks of the Pindar ety from March 9 to July 27. For 6 weeks follow- the storm the brix of damaged stalks remained stant though there was some movement of sugar m butts to tops, coinciding with the development of e shoots. During the same period there was an rease in the brix of sound stalks from 12 to 18 its in the butts and from 7 to 16 units in the tops. ereafter brix in the damaged stalks rose steadily til by the end of the period it had almost reached that the sound canes.

6. ANTOINE, R.
Cane diseases. 1. Chlorotic streak.
A.R. Mauritius Sugar Ind. Res. Stat. 1956, pp. 51-6, illus.

nting date was found to have an important effect the rate of natural infection of cane. The highest idence occurred in November plantings, with a dual decrease to a negligible percentage in July ntings.

77. KING, N. C., AND DICK, J.
Methods of testing for mosaic resistance compared.
Proc. 31st. Congr. S. Afr. Sugar Tech. Ass., reprinted in *S. Afr. Sugar J.*, 1957, **41**: 361-3.

ld tests, with and without mosaic-infected canes nted in alternate rows, were compared with greenuse trials in which canes were inoculated artificially abrasion and by caged aphids. Of the 24 varieties olved 8 were significantly more readily infected by ificial inoculation than by caged aphids, whereas 3 re more readily infected by caged aphids. There were also marked discrepancies between the results obtained in the field tests and those obtained in the greenhouse. It is concluded that artificial methods of testing may produce misleading results by forcing infection on varieties which might not become infected under natural field conditions.

3978. SRIVASTAVA, P. D.
Control of *Hieroglyphus nigrorepletus* Bol.
J. econ. Ent., 1957, **50**: 106-7, bibl. 6.

The grasshopper *Hieroglyphus nigrorepletus* is an important pest in certain crops in India including sugar cane. In laboratory trials 5% BHC dust (Gammexane) gave over 90% control of all 6 stages of *H. nigrorepletus*.—Univ. Allahabad, India.

3979. MONZÓN A., F.
Queima de cana. **(Burning of sugar cane.)**
Solo, 1956, **48**(2/3/4): 53-8, bibl. 6.

The effects of burning on composition and purity of juice depended largely on the interval between burning and cutting. Compared with unburnt cane there was a loss of weight, reduction in purity and sucrose and an increase in reducing sugars. The longer the interval between burning and cutting the greater were these changes. Froghoppers (*Tomaspis* spp.) were destroyed, but *Diatraea saccharalis* was favoured by burning, which killed its predators. Burning encouraged ratoon tillering and facilitated tillage, but the destruction of organic matter and increased weed infestation outweighed these advantages.

Tea.

(*See also* 3996m, 4028.)

3980. FLÉMAL, J., AND GAIE, W.
Le bouturage du théier d'Assam à Mulungu. **(Propagation of Assam tea by cuttings at Mulungu.)**
Bull. Inf. I.N.E.A.C., 1957, **6**: 101-27, illus.

At Kivu in the Belgian Congo, green-wood, 1-internode cuttings taken in Dec.–Jan. were readily rooted in the frames described. The temperature was controlled at 24° C. and the atmosphere was near saturation. The substratum was a 5 : 2 mixture of sand and humus. The best rooting was obtained in 10 weeks by soaking the bases of cuttings for 24 hr. in aqueous indole-3-butyric acid at 60–75 mg./l. At 1,600 m. altitude about 50% of the cuttings planted in the open rooted within 6 months, but at higher altitudes frames were essential. The same hormone treatment or quick dip treatment with NAA at 7,500 mg./l. or 24-hr. treatment with a commercial product (Rh)B, at 50 mg./l. gave promising results.

3981. LAYCOCK, D. H.
Experiments on the use of transplanted stumps for establishing tea in Nyasaland.
Trop. Agriculture Trin., 1957, **34**: 216-31, bibl. 10.

In experiments carried out over 3 planting seasons in 2 localities the best average results were obtained by transplanting 30-month-old stumps, shading the collars with clay pots and giving each stump a starter dressing of 1 oz. of a 6 : 10 : 8 fertilizer, using sulphate of ammonia, superphosphate and muriate of potash.

A cover crop of *Tephrosia vogelii* grown between the rows was detrimental to the plants. All seedlings which gave stumps of diameter $\frac{11}{16}$ in. or over at 4 in. above soil level survived after transplanting, but with present nursery techniques only 1% of the stumps were of this standard. Planting with the early rains is essential if good results are to be obtained.—Tea Res. Stat., Mlanje, Nyasaland. J.R.L.

3982. Masuda, K., and Kubota, T.
The vinyl-house culture of the tea plant. [Japanese, with English summary 14 lines.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 16, pp. 10-13, bibl. 3, illus.

Growth of tea in a plastic greenhouse was promoted by the higher temperature, and plucking was advanced by 1 to 3 weeks. Culture in plastic greenhouses was not considered economic.

3983. Harada, S., Watanabe, A., and Mitsui, M.
Observation of the tea root growth with root-boxes. [Japanese, with English summary 13 lines.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 16, pp. 1-4, bibl. 3, illus.

It was observed that growth of shoots and roots alternated in the young tea plant. The number of growth cycles between June and September varied from 1 to 2 according to variety.

3984. Ali-zade, M. A.
Winter dormancy in the tea plant. [Russian.]
Doklady Akad. Nauk, S.S.S.R., 1957, **113**: 1376-8, bibl. 12.

In the Soviet subtropics tea has a winter rest period, which according to some authors is deepest in December and January, whereas in November and February it could be called relative dormancy. In experiments in Azerbajdžan during the mild and damp autumn of 1955 and the cold spring of 1956 it was found that from October to January the nucleic acid content of the growing points was high and the plants continued to grow, while in February and March the nucleic acid content was low and the plants were dormant. It is concluded, therefore, that the autumn-winter dormancy of tea does not appear to be an indispensable stage in its development, but is directly connected with external conditions.

3985. Takahashi, T., and Aono, H.
Studies on frost damage in the tea garden (Part 2). [Japanese, with English summary ½ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 16, pp. 4-9, bibl. 3.

The effect of frequency of plucking on resistance to frost damage, on the development of the spring growth flush and on tea quality has been studied. The various plucking treatments did not affect chemical constituents of the winter buds and mature leaves. Reducing the number of pluckings increased resistance to frost. Frequent plucking was followed by increased number of leaves in the first crop after the treatment and infrequent plucking by increased weight of individual leaves. Yields during other seasons, tea quality and chemical constituents were not affected b plucking frequency. Longer shoots and internodes and increased weight of individual leaves resulted fron infrequent plucking in the 1st to 3rd seasons.

3986. Tea Research Institute of Ceylon.
Symposium on shot-hole borer.
Tea Quart., 1956, **27**: 83-143, illus.

The proceedings are recorded of a symposium on th shot-hole borer of tea (*Xyleborus fornicatus*) held a Ratnapura on 14 September, 1956. In addition to th paper abstracted below the following may be noted "The shot-hole borer problem", by G. B. Portsmouth "Historical review of shot-hole borer investigations" by G. D. Austin; "Research work on shot-hole bore October, 1955, to August, 1956", by E. Judenko "Field observations on the pest in the low-country" by T. E. Walter; "Observations on shot-hole borer i tea small holdings", by R. L. Illankoon; and "Manurin of tea and possible connections with shot-hole bore attack", by J. A. H. Tolhurst. The views of 3 planters associations are also reported. J.R.L.

3987. Webster, B. N., and Visser, T.
Pathological and physiological implications of shot-hole borer infestation.
Tea Quart., 1956, **27**: 114-19, illus.

In this preliminary account it is stated that sectionin of shoots attacked by shot-hole borer has shown tha 80% of the conducting tissue of some shoots wa occluded somewhere along its length, but that labora tory experiments on the uptake of water by such shoot were inconclusive. Observations have shown tha wood rot fungi invasion and attacks by shot-hol borer could be traced to a short snag left when a branc broke and that die-back is often due to the bud belov a pruning cut being damaged by a shot-hole bore gallery being opened too near to it. J.R.L.

3988. Kuwabara, Y., Takeo, T., and Furuhata, A.
The respiration of plucked tea leaves and the changes in internal constituents of the leaves. (Part 2) The change of the mechanism of respiration and the variation in the quality of tea. (Part 3) The changes of nitrogenous compounds. [Japanese, with English summaries ⅓ p. each.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 16, pp. 20-5, bibl. 10, illus., and pp. 26-31, bibl. 13.

Respiration of plucked leaves declined during storag to a minimum after 48 hours. Peroxidase and pol phenoloxidase activity increased to a maximum aft 24 to 48 hours' storage and subsequently decline Total sugars had largely decomposed after 48 hour storage. Oxidized tannin products and gallic ac accumulated during storage, the change being pa ticularly marked in conditions of high temperature ar low humidity. After 48 hours' storage there was marked decline in quality of green tea. During stora soluble-N, ammonia-N, amide-N, and α-amino- increased, but insoluble-N and nitrate-N decrease There was no apparent change in caffeine-N, and amir acids increased only slightly. Changes in chloroph varied with storage conditions. Protease activi increased to a maximum after about 48 hours. stora and then declined.

ISHIGAKI, K., AND KAWAI, S.
Molybdenum content of tea leaf. [Japanese, with English summary 15 lines.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 16, pp. 40-3, bibl. 4.

Mo content of tea leaves varied with the plucking
on, those of the first crop being richer in Mo than
e of the second and third crops or than the winter
es. Mo contents were higher in young than in
leaves. Mo contents decreased with a reduction
oil acidity. Plants grown with nitrate-N contained
Mo and more nitrate-N than plants grown with
nonia-N.

Sundry crops.

(*See also* 3996n, 3997d.)

CIBES, H., AND SAMUELS, G.
Mineral-deficiency symptoms displayed by acerola trees grown in the greenhouse under controlled conditions. [Spanish summary 2 pp.]
Tech. Pap. P.R. agric. Exp. Stat. Río Piedras **15**, 1955, pp. 18, bibl. 4, illus., [received 1957].

ogen omission had the greatest effect in decreasing
th and yield of *Malpighia punicifolia* trees grown in
culture. Fruit production was also drastically re-
d by lack of P, B, S and Fe. Magnesium and Mn
encies had little effect on the factors measured.
ssium deficiency reduced tree girth but fruits were
rous although small. Growth was markedly
ed by Ca deficiency. Visual symptoms of
ral deficiencies are described and illustrated by
red photographs.

DEL CAMPILLO, A., AND ASENJO, C. F.
Bound ascorbic acid in acerola juice. [Spanish summary ⅓ p.]
J. Agric. Univ. P.R., 1957, **41**: 134-9, bibl. 12.

rola juice, fresh, frozen, or canned, was found to
ain in the neighbourhood of 0·22% by weight of
alcohol-insoluble precipitate containing bound
rbic acid and about 1·25% nitrogen. Of the total
rbic acid 0·18% was in the bound form. [From
ors' summary.]

2. RAGHAVAN, V., AND BARUAH, H. K.
On factors influencing fruit-set and sterility in arecanut (*Areca catechu* Linn.). II. Germination of pollen grains and growth of pollen tubes under the influence of certain auxins, vitamins and trace elements.
Phyton, 1956, 7: 77-88, bibl. 16, illus.

canut pollen grains were cultured in 0·75%
ose, to which various concentrations of 4 auxins,
tamins and 7 trace elements had been added.
en germination and tube growth was stimulated to
onsiderable extent by boric acid, ascorbic acid,
-aminobenzoic acid and auric chloride. Some of
compounds caused abnormalities in the pollen
s and these are described. The possibility of
ying palms with appropriate stimulants during
ering to improve fruit set [*H.A.*, 27: 1954] is dis-
ed.—Gauhati Univ., Assam, India.

3993. RAMAN, K. R.
A note on the germination of seeds of jack.
South Indian Hort., 1956, **4**: 87-8.

The germination of seeds of 7 types of jack fruit one month after sowing ranged from 57 to 95%. The seedlings of some types made much faster growth than those of other types.

3994. ANANTANARAYANAN, K. P., AND VENUGOPAL, S.
Notes on a new pest, *Lepidogma* sp. (Pyralidae) on *Eugenia jambolana* in Coimbatore.
Indian J. Ent., 1955, **17**: 183-5, bibl. 4, illus., from abstr. in *Rev. appl. Ent.*, 1957, **45**: 212.

Control of the pyralid may be obtained by hand-picking and destruction of infested leaves or by spraying with 1 lb. 50% wettable DDT per 30 gal. water.

3995. CARAÑGAL, A. R., JR., AND ARNALDO, S. R.
The sugars of lanzones (*Lansium domesticum* Correa).
Philipp. Agric., 1957, **40**: 574.

Analysis of the fruits from several lanzone trees showed total sugars to range from 4·91 to 11·60% fresh weight (20·58 to 63·16% dry weight). Reducing sugars, and especially glucose, predominated.

Noted.

3996.

a ANON.
La recherche sur le caoutchouc en Indonésie. (**Rubber research in Indonesia.**) [In French and English.]
Rev. gén. Caoutch., 1957, **34**: 544-61, illus.
Research institutes and experimental stations and their work.

b ARTAZA, C. A.
Colección de variedades de caña de azúcar. (**Collection of sugar cane varieties.**)
Idia, 1956, Nos. 106/8, pp. 292-3, illus.
Observations at Villa Alberdi exp. Stat.

c BECERRA Z., C.
El programa de selección de cacao. (**The cacao selection programme.**)
Cacao en Colomb., 1956, **5**: 61-71.
High-yielding clones listed for Colombia.

d BENAVIDES G., M.
Insectos pasadores del tronco del cacao. (**Scolytid pests of cacao trunks.**)
Cacao en Colomb., 1955, **4**: 43-5, bibl. 4.
Mode of entry of *Xyleborus* spp.

e CAMPAIGNOLLE, J.
Conséquences économiques des recherches rélatives à la physiologie de l'hévéa. (**The economic results of research on the physiology of rubber trees.**)
Rev. gén. Caoutch., 1957, **34**: 222-8 (French), and 389-92 (English), and the latter reprinted in *Planter, Kuala Lumpur*, 1957, **33**: 433-8.
With particular reference to work in Indo-China.

f CHEVAUGEON, J., AND MERNY, G.
Maladies des arbres à quinquina en Guinée française. **(Diseases of cinchona in French Guinea.)**
J. Agric. trop. Bot. appl., 1956, **3**: 605-26, bibl. 24, illus.
Descriptions, not control measures.

g CORRÊA DE ARRUDA, H.
Variedades de cana para o Estado de São Paulo. **(Sugar-cane varieties for the state of São Paulo.)**
Solo, 1956, **48**(2/3/4): 39-40.

h COSTE, R.
Vue d'ensemble des problèmes posés par la culture cacaoyère et l'amélioration de sa production dans les territoires d'outre-mer. **(A survey of the problems of cacao culture and the improvement of production in overseas territories.)**
Café, Cacao, Thé, 1957, **1**(1): 5-9, illus.
A review of progress in French West Africa.

i DITTMAR, H. F. K.
Über den Einfluss von Methylbromid auf fermentierte Kakaobohnen während der Expurgation. (Vorläufige Mitteilung.) **(The effect of methyl bromide on fermented cacao beans during disinfestation.)** [German, Portuguese, English, French summaries, about 10 lines each.]
Gordian, 1957, **57**(1360): 11-12.
No bromine was taken up by the beans.

j ELÍAS, J.
Nuevas variedades de caña de azúcar pueden reemplazar las existentes. **(New sugar-cane varieties may replace present ones.)**
Idia, 1956, Nos. 106/8, pp. 290-1.
Breeding and selection in the Tucumán province of Argentina.

k FERRAZ DE TOLEDO, F.
Espécies e variedades de caña de acúcar. **(Species and varieties of sugar cane.)**
Solo, 1956, **48**(2/3/4): 43-52.
A brief review on breeding and selection.

l FLOCH, H.
Dosage des carotènes (provitamines A) dans les fruits et légumes guyanais. **(Determination of carotenes (provitamin A) in fruits and vegetables of French Guiana.)**
J. Agric. trop. Bot. appl., 1956, **3**: 809-20, bibl. 11.

m FURUYA, K., AND TORII, H.
Determination of chlorophyll of tea.
[Japanese, with English summary ½ p.]
Study of Tea, Tôkai-Kinki agric. Exp. Stat., Tea Div., 1957, No. 16, pp. 32-6, bibl. 6.
Method and varietal composition.

n GANDHI, S. R., AND GOPALKRISHNA, N.
"The Atemoya", a promising new *Annona* hybrid.
Proc. Indian Acad. Sci., Sect. B, 1957, **45**: 234-46, illus.
Annona cherimola × *A. squamosa.*

o GARCÍA B., C.
Cacao en Colombia. **(Cacao in Colombia.)**
Cacao en Colomb., 1956, **5**: 1-10, bibl. 4.
A regional survey.

p GARCÍA B., C.
La escoba de bruja en Colombia. **(Witches' broom [of cacao] in Colombia.)**
Cacao en Colomb., 1956, **5**: 19-23, bibl. 7.
Variety Pajarito highly susceptible, but native types very resistant to *Marasmius perniciosus.*

q GARCÍA [B.], C.
Resultados de la selección de cacao en Colombia. **(Results fof cacao selection in Colombia.)**
Cacao en Colomb., 1955, **4**: 47-54, bibl. 1.
Mainly reflected in increased numbers of pods per tree per annum.

r GILBEAU, W. F., COLL, E. E., AND MARTIN, L. F.
New sugar canes to improve processing in Louisiana.
Sugar J., 1957, **20**(1): 25-7, 39-40.
Variety C.P. 48-103 had best combination of processing qualities.

s HALLIDAY, D. J.
Nitrogen fertilizers for plantation crops with particular reference to Ceylon.
World Crops, 1957, **9**: 251-5, illus.
With brief recommendations for manuring coconuts, tea and rubber.

t JAYASEKERA, E. W. H.
The culture of sugar cane.
Trop. Agriculturist, 1956, **112**: 281-304, bibl. 5, illus.
Cultural practices and manufacture in various countries surveyed.

u KIBE, M. M., GOKHALE, G. P., AND NARAYANA, N.
Band disease of the areca palm.
Arecanut J., 1957, **7**: 83-4.
Cause not yet revealed by preliminary investigations in Bombay State.

v KNUST, H. G.
Progress in mechanical cane loading.
Cane Grs' quart. Bull., 1957, **20**: 134-5, illus.
A one-man hydraulic loader described.

w KNUST, H. G.
Spiked-wheel cane weeder.
Cane Grs' quart. Bull., 1957, **20**: 138-9, bibl. 1, illus.
Cultivating from 12 to 15 acres per day.

x LEJEUNE, J. B. H.
Report to the government of Sudan on coffee production.
FAO Rep. **566**, 1956, pp. 15.
Considerable expansion possible and recommended procedure.

(Lepage, H.)
Tipos de cochonilhas que estão atacando os cafèzais. **(Types of mealybug attacking coffee.)**
Fôlha da Manhã, 13 Oct. 1956, reprinted in *Bol. Super. Serv. Café, S. Paulo*, 1956, **31**(357): 45-7.
And control by Rhodiatox in mineral oil.

Levy, S.
Agriculture and economic development in Indonesia.
Econ. Bot., 1957, **11**: 3-39, bibl. 53, illus.

Lister, J. H.
Estudio sobre los mercados agrícolas en Guatemala y las posibilidades de un mejoramiento futuro. **(Study of agricultural markets in Guatemala and possibilities of future improvement.)**
[*Publ.*] *Minist. Agric. Guatemala*, 1956, pp. 155, illus.
Crops include coffee, beans, bananas, sugar cane and essential oils.

Montserin, B. G.
Banana growing in Trinidad and Tobago.
J. agric. Soc. Trin. Tob., 1956, **56**: 527-75.

Naundorf, G., Idrobo [M.], S., and Sanclemente, M.
Transmisión y diseminación del *Ophiostoma fimbriata* causante de la pudrición azul en el cacao. **(Transmission and spread of *Ophiostoma (Ceratostomella) fimbriata*, causing blue rot in cacao.)**
Cacao en Colomb., 1956, **5**: 29-33, bibl. 7.
Mechanical agents include *Xyleborus* spp.

Nicol, B. M.
Ascorbic acid content of baobab fruit.
Nature, 1957, **180**: 287, bibl. 3.
Fruit of *Adansonia digitata* is an important source of ascorbic acid in Nigeria.

Ocfemia, G. O., and Bustrillos, A. D.
Electron microscopy of the unpurified extracts of coconut infected with the cadang-cadang disease.
Philipp. Agric., 1957, **40**: 553-8, bibl. 1, illus.
Evidence suggesting that a virus is responsible.

Parra, J.
El analisis químico de las hojas de las plantas y su aplicacion en el cultivo del café. **(The chemical analysis of leaves and its application to coffee growing.)**
Rev. Cafet. Colombia, 1957, **13**: 122-8, bibl. 17.
A review.

Pemberton, C. E.
The Hawaiian sugar industry.
World Crops, 1957, **9**: 237-41, illus.
Including work of the Experiment Station of the Hawaiian Sugar Planters' Association.

h Piñero, M., and Calderón, J. R.
Estudio sobre la explotación económica de 134 fincas de caña de azúcar, Puerto Rico, 1950–51. **(An economic study of 134 sugar plantations in Puerto Rico, 1950-51.)** [English summary 3 pp.]
Bol. Estac. exp. agríc. Río Piedras, P.R. **132**, 1956, pp. 134.

i Raghavan, T. S.
Sugar-cane breeding in India.
World Crops, 1957, **9**: 242-6, illus.

j Roy, R. S., Mallik, P. C., and Sinha, R. P.
Mango breeding in Bihar, India.
Proc. Amer. Soc. hort. Sci., 1956, **68**: 259-64, bibl. 10.
Hybridization technique, results, and descriptions of 3 hybrids at Sabour.

k Rubber Research Institute of Ceylon.
Magnesium deficiencies.
Adv. Circ. Rubb. Res. Inst. Ceylon **59A**, 1957, pp. 2.
Suggestions on fertilizer mixtures containing Mg, supplementing *Circ.* 37A [*H.A.*, 25: 2199].

l Said, M.
Banana cultivation in Peshawar and D.I. Khan regions.
Agric. Pakistan, 1956, **7**: 240-8, illus.
Varieties, cultural practices and diseases.

m Samuels, G., and Capó, B. G.
Research with sugarcane fertilizers in Puerto Rico, 1910-54.
Tech. Pap. P.R. agric. Exp. Stat. Río Piedras **16**, 1956, pp. 104.
Results of work at Río Piedras from 1910 to 1954 reviewed.

n Simão, S.
Considerações sobre caracterização de variedades de mangueira. **(Observations on the identification of mango varieties.)**
Solo, 1956, **48**(1): 25-8, bibl. 9.
A brief review of features used in classification.

o Soesman, J. G.
Parasitaire wortelschimmels en de bestrijding daarvan in heveaherontginningen en -kwekerijen. **(Parasitic root rots and their control in replanting hevea and in nurseries.)**
Bergcultures, 1957, **26**: 234-7.

p Stevenson, G. C.
The problem of breeding high-sucrose sugar cane varieties.
Proc. 9th Congr. int. Soc. Sugar Cane Tech. 1956, reprinted in *Sugar News*, 1957, **33**: 62-6, bibl. 13.
With particular reference to work in Barbados.

q Suárez de Castro, F.
Cuánto vale un cafeto? **(What is a coffee tree worth?)**
Rev. Cafet. Colombia, 1957, **13**: 113-16.
Including a formula for calculating the value of 1 ha. of coffee.

r **TONG, T. H.**
Een beschouwing over heveazaailingenselectie bij het Algemeen Proefstation der A.V.R.O.S. **(A survey of hevea seedling selection at the General Experiment Station of the AVROS.)** [English and Indonesian summaries ½ p. each.]
Bergcultures, 1957, **26**: 211-33, bibl. 17.
The advantages of clonal seedlings and methods of producing them discussed.

s **TONG, T. H.**
Results of a thinning-out experiment in a polyclonal planting at Polonia.
Arch. Rubbercult., 1957, **34**: 21-54, bibl. 6.
See *H.A.*, 27: 2919.

t **VARELA MARTÍNEZ, R.**
Producción de azúcar en Colombia. **(Sugar production in Colombia.)**
Agric. trop. Bogotá, 1957, **13**: 157-60.
Production, consumption and export figures.

u **WILBAUX, R.**
Le séchoir brésilien Torrès. **(The Torrès coffee drier from Brazil.)** [Flemish summary ½ p.]
Bull. agric. Congo belge, 1957, **48**: 329-37, illus.
Description of rotating drum machines in 4 sizes with capacities ranging from 900 to 7,600 litres.

NOTES ON BOOKS AND REPORTS.

Books.

3998. ARLAND, A., AND OTHERS.
Magnesium—a plant food.
Bergbau-Handel, Berlin, 1956, 8×5½ in., pp. 239, bibls, illus.

This symposium on the role of magnesium in plant growth is a translation into English by G. and S. Lewin of the German edition published in 1952 [see *H.A.*, 23: 1371]. It comprises 11 papers varying from one which should inspire the farmer to look more critically at his Mg/K fertilization to one designed for the scientist employed in fundamental research.

The first paper describes a method for predicting crop yield at an early stage of growth by determining the water transpired per unit weight of green plant. It is claimed that, by so doing, disorders can be detected and remedied. Applications of the techniques are reported in the second paper. A useful summary follows of facts known on the practical importance of magnesium fertilizers, dealing both with magnesium in the plant and as applied to the soil. Next, the uptake of magnesium and potassium by cereals and the effects thereof are discussed, and this is followed by a short descriptive paper on the effects of applying magnesium alone, or with boron, to plants. Prof. G. Michael in a long and interesting paper on the absorption and distribution of magnesium and its function in the more complex green plants reviews the contradictory results obtained so far and suggests lines for further research. Among other papers there is one dealing with magnesium and other elements in conifers, another on symptoms of magnesium and potassium deficiency, and, finally, a purely practical paper on fertilizers.

Throughout the book the importance of balanced fertilizer applications and the complexity of magnesium nutrition in relation to different soil types are emphasized. Among the crops studied cereals predominated and no work is reported on the magnesium nutrition of fruit. Most of the references cited are to German work. E.M.F.

3999. BRAUN, H., AND RIEHM, E.
Krankheiten und Schädlinge der Kulturpflanzen und ihre Bekämpfung. **(Diseases and pests of cultivated plants and their control.)**
Paul Parey, Berlin, 8th edition, 1957, 9½×7 in., pp. 368, bibl. in text, illus., DM 29.80.

For more specialized studies the reader is referred
the very numerous and authoritative handboo
already issued and in perpetual process of issue
Paul Parey, namely the Handbücher der Pflanze
krankheiten. In this work different crops and the
various pests and diseases and control are considered
turn. Horticultural crops, the enemies of which a
separately dealt with, are carrots, peas and bean
cabbages, tomatoes, onions, asparagus, cucumber
poppies, tobacco, hops, deciduous fruits and vine
A final chapter deals with the numerous diseases whi
occasionally attack a large number of different cro
with disastrous results, e.g. root fungi, wireworm
crane flies, aphids, slugs, mice, birds. The book en
with brief notes on hail and frost damage and i
prevention.

Generally speaking a clear idea is given of recommend
control measures for various complaints, but the exa
detail of the application of such measures is usual
left to the imagination or knowledge of the reade
In every case the reader who wants more is given
reference to other sources of information.

It is a most useful general book.

D.A.

4000. FOURMONT, R.
Les variétés de pois (Pisum sativum *L.*) *cultivés en France.* **(Pea varieties grown in France.)**
Institut National de le Recherche Agronomique, Rue Keppler, Paris, 1956, 10×6½ in., pp. 253+70 black and white and 9 coloured plates, bibl. 70, 1,600 f.

This work surely gives all that anyone can want
know for a long time on the literature, origin a
history, botanical and agronomical characters, and
the growth, shape, and consistency of different pa
of the plant of the common garden pea as grown
Western Europe, in particular in France. A comm
sense classification, based essentially on whether roun
seeded with yellow cotyledon, ditto with green coty
don, wrinkled-seeded or mange tout, leads to an illu
trated key for determining the identity of some 2
varieties including many grown commercially
England. No mention is made of cultivation practi
The illustrations are excellent and the descriptio
short and concise.

D.A.

1. Genders, R.
Soft fruit.
Rupert Hart-Davis, Lond., 1957, 7½×5½ in.,
pp. 143, being No. **14** in the Countryman
Library Series, 11s. 6d.

seful addition to this elegant series of small hand-
ks by practical men for men who want to do some-
g well on a small scale. Starting with the business
spects and proceeding via a consideration of climate,
and situation, the author discusses in turn the
ural needs in England of the following small fruits:
wberries 35 pp., raspberries 13 pp., gooseberries
pp., black, red and white currants 16 pp., black-
ies, etc., 10 pp. In addition 4 pages are devoted
blueberries and 8 to rhubarb. The 2 concluding
pters deal with marketing and presentation and the
trol of pests and diseases. Use is made of modern
arch findings. D.A.

2. Guinea, E.
Manzanas de España.—Asturias. **(Apples in Spain—Asturias.)**
Instituto Nacional de Investigaciones
Agronómicas, Madrid, 1957, 9½×6½ in.,
pp. xxxix+209, bibl. 56, illus.

premature death of J. Martínez Hombre left his
iled study of Asturian apple varieties incomplete,
the work has now been finished by the eminent
nist under whose authorship it appears. This is the
volume of a series envisaged to cover apple
eties throughout Spain. In the introductory section
subjects discussed are: the concept of variety;
enclature; pomography (descriptive pomology) and
ystematics. The last sub-section is illustrated by
line drawings. Descriptions of individual varieties
py the bulk of the book. For each variety notes
name, origin, size and other characteristics of fruit,
ning, storage life and tree characteristics are
ged on a single page. Opposite this is a colour
e reproduced from water-colour drawings of the
le fruit and of transverse and longitudinal sections
ugh its centre. The clear descriptive notes and
wings should be very valuable in identifying varieties,
for prospective growers an additional note on
ination requirements would have been useful.
K.C.

3. Imms, A. D. (revised by Richards, O. W., and Davies, R. G.).
A general textbook of entomology.
Methuen, London, 9th edition, 1957,
10×6 in., pp. 886, illus., 75s.

reat deal of this standard entomological textbook
been out of date for some years (it was previously
sed in 1934) and Prof. O. W. Richards and R. G.
vies, both of Imperial College, London, have
rged and modernized it in substance and appear-
e. Yet the general plan of the book remains the
e, and those who knew their way around "Imms"
dfold will still be at home with the new version.
section on physiology, a branch in which much
arch has been done in recent years, has been entirely
ritten. The alterations in the section on classifica-
and phylogeny of insects may not meet with the
roval of all, but any work connected with systematics
ns to cause feeling to run high. There will be those
would rather return to the old system with 23 orders instead of the new 29, or would prefer the Coleoptera after the Lepidoptera as in the old days, and there will of course be those who say the changes are not drastic enough. On the other hand, no one, I am sure, will complain about the increased bibliographies and the vast improvement in the manner of citation. It will not be at Imperial College only that future generations of entomological students will be advised to buy the "new Imms". J.R.L.

4004. Institut de Recherches pour les Huiles et Oléagineux (I.R.H.O.).
Plant analysis and fertilizer problems.
2nd Colloquium organized by I.R.H.O.,
Square Pétrarque, Paris 16e, as part of the
6th int. Congr. Soil Sci., Paris, 1956, publ.
1957, pp. 410, bibls, illus., 2,000 fr.

Some of the papers presented in this symposium have been abstracted separately. Others of horticultural interest are: Methods of diagnosing the mineral status of plants, by T. Wallace; Some problems of foliar diagnosis for orchard fertilizer recommendations, by J. C. Cain; The physiological role of boron in plants, by M. J. Chkolnik and others; Observations on the relationship between mineral composition of the plant and yield (in French), by P. Gouny; Some aspects of the relationships of nutrient supply to nutrient uptake and growth of plants as revealed from nutrient culture experiments, by E. J. Hewitt; An appraisal of the use of chemical tissue tests for determining the mineral status of crop plants, by D. J. D. Nicholas; Diagnosis of the fertilizer needs of plants (in French), by V. Tserling; A method of using foliar diagnosis (in French), by P. Prevot and M. Ollagnier [see also *H.A.*, 26: 1159 and 27: 892]; Improvement of the nutritional condition of plants by use of manganese fertilizers (in German), by R. A. Wlassjuk; Occurrence and correction of micro-element and magnesium deficiencies in deciduous orchards and vineyards in the Union of South Africa, by E. Beyers [see *H.A.*, 26: 3460]; Treatment of plants for correction of iron chlorosis (in German), by R. Gasser and J. Müller [see *H.A.*, 27: 1246]; Recent work on foliar diagnosis in relation to the nutrition of some deciduous trees and soft fruit crops, by C. Bould [see *H.A.*, 26: 3418]; The manuring of olives: the solution supplied by foliar diagnosis (in French), by A. Bouat [see *H.A.*, 23: 2208, 24: 820 and 25: 2083]; The capacity of apple trees for absorbing relatively insoluble phosphate (in German), by G. Reinken [see *H.A.*, 27: 2152]; Studies on the rational management of hevea by physiological diagnosis based on the mineral analysis of different parts of the plant (in French), by E. R. Beaufils [see *H.A.*, 27: 2920]; Some aspects of mineral deficiencies and the chemical composition of oil palms, by H. Broeshart [see *H.A.*, 27: 891]; and Results obtained with foliar diagnosis of vines (in French), by J. F. Lévy.

4005. Jex-Blake, A. J. (Editor).
Gardening in East Africa—A Practical Handbook.
Longmans, Green & Co., Lond., 4th edition,
1957, 10×7 in., pp. 414, illus., 45s.

This magnificent book is so definitely written by dwellers in East Africa for other dwellers in East Africa—who will surely know all about it without chat from outside

—that one almost hesitates to recommend it to outsiders.

Yet recommend it one must on many grounds such as the following: the writers are not merely experts on their subject but experts with particular reference to Kenya or Uganda or Tanganyika, so that everything they say carries the extra weight of practical experience and enthusiasm. It is a comprehensive book and concerns not only every form of ornamental amenity but also the provision of vegetables and fruits. It does not ignore the seamy side of life but includes advice from Government entomologist and mycologist on how to prevent and control common pests and diseases. While most of the recommendations would perhaps seem to concern Kenya conditions in particular, separate chapters are devoted to gardening at the coast, and to gardening in Uganda and gardening in Tanganyika.

The whole work is very properly based on the contents of the opening chapters, which concern climatic factors and the plant and its environment. Three chapters follow with special reference to local conditions on garden planning, elementary horticulture and propagation. Then come separate chapters on the cultivation of the following: annuals, perennials, roses, flowering trees and shrubs, climbers, bulbs, succulents, orchids (both exotic and indigenous), water plants, pot plants, indigenous plants, lawns, and hedges. Orchard prospects and recommendations are dealt with both as regards temperate and tropical fruits and vegetables and herbs. Vegetables and fruits at the coast are considered separately.

The whole is embellished and rendered even more attractive by the provision of 23 clear, very vivid coloured plates, three by P. R. O. Bally and the rest by Mrs. Adamson, showing a wide range of East African flora. The price for a book of its calibre seems definitely low. It cannot need commendation to East Africans: to others it is most heartily recommended.

D.A.

4006. MAGILL, P. L., HOLDEN, F. R., AND ACKLEY, C. (EDITORS).
Air pollution handbook.
McGraw Hill, N. York, Toronto and London, 1956, 9×6 in., pp. 670, bibls, illus., $15.00.

Air pollution has become a very serious problem to the horticulturist who produces his wares near the scene of man's industrial triumphs in the heavy metal or chemical manufacturing world, wherever in fact the partially consumed products of oil or coal are poured into the atmosphere. More and more in the future, moreover, as man gets closer and closer to the final glorious XYZ bomb, which will most certainly end all bombs and everything else as well, he will doubtless also have to contend with radioactive fall out and effluents. At least as regards old fashioned crop deterioration due to industrial activity and to the smog that tends to detract from the merits of Los Angeles as a health resort, this stout book will tell him all and probably far more than a mere horticulturist can possibly want to know. The book is in separate sections, each paginated separately, each by its own expert or experts and each with a hundred or more additional references for the "unco" inquisitive. Section 9 entitled "Effect of air pollution on plants (pp. 44, bibl. 129) is by Moyer D. Thomas, now Senic Scientist, Dept. of Chemistry, Stanford Researc Institute, Menlo Park, Calif., and Russell H. Hendricks Chemist of the Dept. of Agricultural Researc American Smelting and Refining Company, Salt Lak City, Utah. They deal exhaustively with sulphu dioxide, hydrogen fluoride, miscellaneous fumigants and smog effects on plant life and the diagnosis gas damage.

This is only one small section and it may be said of th remaining 13 that Nos. 1 and 2 state the prese situation, Nos. 3–6 concern the science of air pollutio No. 7 its epidemiology, No. 8 its effects on farm anima and Nos. 10–14 various corrective techniques. short the book tells us what is known and how tha knowledge can be applied and it indicates in wha directions further research is necessary.

D.A.

4007. ROWE-DUTTON, PATRICIA.
The mulching of vegetables.
Tech. Commun. Bur. Hort. Plant. Crops, East Malling, **24**, 1957, pp. 169, bibl. 345, illus., £1 or $2.80.*

The author shows how the general principles mulching enunciated in Technical Communication 4 of the Soils Bureau have been applied to the cultivatio of vegetables. The vegetables in question are asparagus, brassicas, cucurbits, globe artichokes, lettuce an endive, onions and leeks, peas and beans, potatoe rootcrops, sweet peppers and eggplants and tomatoe The mulch materials include the following: aluminiu foil, bituminous emulsion, chaff, compost, grass, ha maize fodder, manure, paper in many forms, pea polythene plastic, sawdust, straw, vermiculite and woo wool. The effects of mulching on growth, maturit pests and diseases and yield and quality and economic value are discussed for each crop.

4008. RUHLAND, W., AND OTHERS (EDITORS).
Handbuch der Pflanzenphysiologie. Band VII. Stoffwechselphysiologie der Fette und fettähnlicher Stoffe. **(Encyclopedia of plant physiology. Vol. 7. The metabolism of fats and related compounds.)**
Springer-Verlag, Berlin, Göttingen and Heidelberg, 1957, 10×6½ in., pp. 512, DM. 108.

The articles in this volume which are of particul interest to the horticultural investigator are t following: Zeller, A., Physiologie der Fettbildung u Fettspeicherung bei höheren Pflanzen. (Physiology fat formation and fat storage in the higher plants pp. 280-322, bibl. 8 pp. Zeller, A., Die Mobilisieru der Fette bei der Keimung. (The mobilisation of fats germination), pp. 323-49, bibl. 4 pp. Schmalfuss, K Die wirtschaftliche Bedeutung der Pflanzenfette u Fettpflanzen. (The economic importance of pla fats and oil plants), pp. 354-75, bibl. 19, includi short notes on plants providing different sorts of oi Lovern, J. A., The phosphatides and glycolipid pp. 376-92, bibl. 4 pp., in microorganisms, seed vegetative tissues and algae.

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* Obtainable from C.A.B., Farnham Royal, Bucks., Engla

9. SCHØYEN, T. H., AND OTHERS.
Skadedyr og sykdommer i frukt- og baerhagen. **(Pests and diseases of top and small fruits.)**
H. Aschehoug & Co. (W. Nygaard), Oslo, 4th edition, 1956, 9×6½ in., pp. 197+23 colour plates, illus., N. kr. 23.

at distinguishes this book from others of its kind at it is grouped around 23 colour plates, each with excellent pictures illustrating the more important ases and pests of fruit plants. Another 115 line wings and photographs reinforce the pictorial bias he manual. The concentrated text is divided into ain parts: (1) Pests and diseases common to several t plants (pp. 10–48), including nutritional and other -parasitic diseases. (2) Individual pests and diseases op and small fruits (pp. 49–174), arranged by crops. General remarks on preventive, mechanical and mical measures of control (pp. 175–90). (4) Pre- ory and parasitic insects (pp. 91–2). Virus diseases, etimes neglected in continental textbooks, receive r share of attention.

popularity which the manual enjoys among the t growers of Norway is evident from the fact that is the 4th edition issued since 1942 and that the nber of copies printed now totals 17,000. For this edition the original authors, *T. H. Schøyen* and *ørstad*, obtained the help of *J. Fjelddalen* and *amsfjell*, both of whom are well known to readers Norwegian horticultural journals. The book is sored by the Norwegian horticultural society.

V.H.G.

0. WALKER, J. C.
Plant pathology.
McGraw-Hill, London, New York and Toronto, 2nd edition, 1957, 9×6½ in., pp. 707, bibls, illus., $10.00 or 75s.

text of this work by a well-known American nt pathologist is substantially that of the first ion of 1950 with some minor amendments and itions designed to bring it approximately into line subsequent rapid research advances.

s, as it claims to be, an *introduction* to the whole l of plant pathology for students, and not in any se a general work of reference or a handbook to vidual plant diseases. The one hundred or so ases which are described in some detail have, efore, been selected as representative and illus- ive of the principal types and groupings of these ases, comprising non-parasitic diseases and those ited' by bacteria, myxomycetes, fungi, phanerogamic asites, nematodes and viruses respectively. In selection, perhaps inevitably in a book dealing narily with the American scene, European readers miss, both in the descriptive texts and in the lists elevant literature, with which each principal section cludes, references to certain diseases and pathogens viding major topics in their lecture-rooms.

these chapters dealing with the specific groups of ases are added chapters on general topics such as demiology, host-parasitic interactions and the ous approaches to the problems of control. The ume is prefaced by a general introduction to, and ory of, the subject, and concludes with a com- ensive index.

R.V.H.

4011. WESTERN CANADIAN SOCIETY FOR HORTICULTURE.
Development of horticulture on the Canadian Prairies: an historical review.
Western Canadian Society for Horticulture [Morden, Man.?], 1956, 13×8 in., pp. 184 (Stencilled).

This must surely be one of the most interesting and valuable horticultural productions which have come out of Canada. Those who have produced it by their contributions—and they are many—are to be congratulated on placing on record the unique experiences and labours of Prairie pioneer horticulturists before time could quite obliterate their memory and achievements. One's only regret is that the work is stencilled and not printed and is therefore more liable to fall by the wayside in libraries, which all sooner or later must economize in space.

What then do the authors give us that is so important? First they give short accounts of the work of 59 pioneers, either practising horticulturists or those concerned in the administration or investigation of horticulture. Theirs, it may be said, was the essential foundation work on which present Prairie horticulture is based. Next we hear of horticulture under the Provincial Department of Agriculture in the 3 Provinces and of the Horticultural Station at Brooks, Alberta, then of the establishment and work of the following institutions: the University of Manitoba at Winnipeg, the Department of Horticulture of the University of Saskatchewan at Saskatoon and the University of Alberta at Edmonton. Next comes work at the Federal Experimental Farms at Beaverlodge, Lacombe and Lethbridge in Alberta, Brandon and Morden in Manitoba and Indian Head, Melfort, Scott and Swift Current in Saskatchewan, and at the Forest Nursery Stations at Indian Head and Sutherland in Saskatchewan.

The various problems of Prairie horticulture, how they have been assayed and dealt with, are considered mainly under the headings of Ornamentals, Vegetables and Fruit Production. The development of specialized horticultural societies is outlined. The all important problem of Field Shelterbelts earns a special article and there are articles also on Special Cultural Practices and Problems and on Nutrition and Chlorosis, on Hardiness Research and on Horticulture in the Northwest Territories of the Yukon. Dr. Hill, Chief of the Horticulture Division, Ottawa, summarizes in "Fifty years Progress in Horticulture" the changes that have come over fruit and vegetable production throughout Canada in recent years, and finally R. J. Hilton, recently Professor of Horticulture at the University of Alberta and now Head of the Department of Horticulture at the Ontario College of Agriculture, Guelph, looks forward with humour and acumen. While all seem reluctant to claim credit for the compilation, it cannot have emerged without the knowledge of the secretary-treasurer, V. W. Nuttall of Morden. It is a great achievement.

D.A.

4012. WOOD, J. P.
Pruning.
Collingridge, London, 1957, 8½×6 in., pp. 60, illus., 7s. 6d., being *Amateur Gardening Picture Book* 9.

The author deals pictorially and with great clarity with the pruning of common decorative shrubs, roses, fruit trees, vines and cobnuts.

Annuals and reports.

4013. BARBADOS.
Annual Report of the Department of Science and Agriculture for the year 1954-1955 [1957?], pp. 77.

The following are among the many items in the report which relate to sugar cane: *Breeding:* Two outstanding seedlings have been selected for commercial trial, viz. B.4744 which does well in intermediate and high rainfall areas, and B.49119. *Chemistry:* There was a reduction in yield when N was applied in January compared with June–July; preliminary results show that a modified spacing would probably result in increased yields under irrigation. *Agronomy:* Bagasse appears to exercise a beneficial effect upon yield which is independent of its effect as a mulch. *Entomology:* reasonable control of the cane root mealy bug (*Neorhizoecus* sp.) and its associated ant was obtained by ploughing in BHC during land preparation or by broadcasting BHC on the soil of infested fields.

4014. BUNDESANSTALT FÜR QUALITÄTSFORSCHUNG, GEISENHEIM. (SCHUPHAN, W.).
Bundesanstalt für Qualitätsforschung pflanzlicher Erzeugnisse, Geisenheim/Rheingau. Tätigkeitsbericht 1 April 1956–31 März 1957. **(Annual Report of the Federal Institute for Quality Research in Plant Products, Geisenheim, 1 April 1956 to 31 March 1957)**, 1957, pp. 28, illus.

Research is chiefly concerned with the quality and nutritional value of vegetables and how these may be affected by manuring and insecticidal treatments.

4015. COLONIAL RESEARCH COUNCIL.
[*Annual Reports for 1955-1956*], London, 1956.

The reports of several bodies, in previous years received in a single volume entitled *Colonial Research*, have been received as separates, as follows:

Eleventh Annual Report of the Committee for Colonial Agricultural, Animal Health and Forestry Research (*1955–1956*), 1956, pp. 10–115.

The chief horticultural and plantation crops on which research is reported from various parts of the world are cacao, bananas, coffee, sugar cane, oil palms, tobacco, citrus, coconuts, pineapples, tea, tung and cloves.

Ninth Annual Report of the Colonial Pesticides Research Committee (*1955–1956*), 1956, pp. 182–207.

Studies outlined concern, among others, insecticidal residues on vegetation, herbicide evaluation, pests of coconuts, cacao, citrus, coffee and cashew nuts, and diseases of bananas and tea.

Third Annual Report of the Colonial Products Council (*1955–1956*), 1956, pp. 209–36.

Investigations at the Colonial Products Laboratory have been conducted on essential oils, oils and fats, waxes, fruits, tobacco, insecticides, vegetable drugs and fibres, and tanning materials. Other work reported includes fermentation of cacao beans and suga technology.

4016. GEISENHEIM (STEINBERG, J.).
Lehr- und Forschungsanstalt für Wein-, Obst- und Gartenbau, Geisenheim (Rheingau). Bericht für das Rechnungsjahr 1955/56. **(Annual Report of the Geisenheim Horticultural College and Research Station for 1955/56)**, pp. 109, bibl. numerous.

Among investigations reported are: *Department o Botany:* Flower biology of hazel nut, walnut, almon sour cherry, apple, pear and black currant; pigment in grapes; culture of *Iris* embryos. *Department o Plant Diseases:* Studies of phylloxera, Mediterranea fruit fly, wilt in *Statice*, and *Pcstalotia* attack on ericas *Department of Soils and Plant Nutrition:* Soil media fo *Erica gracilis* and *Azalea indica*; liming of *Static tatarica*; mulching of tomatoes and cucumbers; folia sprays for fruit; soil conditioner tests in vineyard *Department of Vine Breeding and Propagation:* Testin of new varieties and rootstocks; studies on graftin methods; temperature effect on sprouting of vine effect of hormones on vine growth. *Department o Viticulture and Wine Making:* Manurial, spacing an clone trials. *Department of Fruit Growing:* Rooting o apple varieties on nurse roots, and root formation o apple nurse roots in relation to rootstocks; walnu propagation in the field. *Department of Horticultur* Variety trials with chrysanthemum, *Coleus blum Begonia* spp., *Hedera helix* and *Saintpaulia*; compo studies. *Department of Vegetables:* Variety trials wit glasshouse and outdoor tomatoes, lettuce and othe crops; raising tomato seedlings with infra-red light an 2 types of compost; spacing trials with celeria manurial trials.

4017. HAWAII.
Biennial Report Hawaii Agricultural Experiment Station, 1954-56, 1956, pp. 63, illus.

Work briefly summarized includes: *Agricultur economics:* Marketing frozen passion fruit and gua juices and flowers and foliage in the U.S.A. *Agr cultural engineering:* Macadamia husking machine a passion fruit juice extractor; and treatment of papa in ethylene dibromide and hot water for fruit fly contr *Entomology:* Bacteria and viruses for the control lepidopterous pests of crucifers; methods of controlli *Dacus* spp., mites, macadamia nut borer and cattle fly; and bee pollinators of passion fruit. *Foods a nutrition:* Freezing studies on, and sodium contents fruits and vegetables. *Horticulture:* Cytogenetics orchids; improvement of commercial strains of papa macadamia variety trials; and culture of passion fru guava and coffee. *Plant pathology:* Control of diseas of fruits, vegetables and ornamentals. *Plant physiolog* Sugar cane crop logging; pollination studies on passi fruit; vapour heat treatment of papaw; and macadam and coffee nutrition. *Soils and agricultural chemistr* Identification of pectinesterase in papaw juice; passi fruit and guava juice manufacture; and mango pr cessing. *Vegetable crops:* Breeding for disease resi tance and quality in tomatoes, lettuces, cucurbits a peas; B nutrition of lettuces and broccoli; and varie trials.

3. HELLYER, A. G. L.
The Amateur Gardening diary and horticultural directory, 1958.
Collingridge, London, 1957, 7½×5 in., pp. 160, 7s. 2d.

ile the diary—with hints—remains at the possessor's icy to make or mar, the directory is brought up to —at least tolerably so—and is indispensable for ce use in the U.K.

9. 's-HERTOGENBOSCH (AND MIDDELRODE).
Verslag 1953. Tuinbouw proef- en selectiebedrijf te Middelrode en proefnemingen van het Rijkstuinbouwconsulentschap te 's-Hertogenbosch. **(Report for 1953 of the horticultural experiment and selection establishment at Middelrode, and experiments of the State Horticultural Advisory Service at 's-Hertogenbosch),** pp. 77.

ong the many practical investigations reported fly are: *Strawberries:* selection and breeding, etal and yield trials, permanent and temporary w mulches, turnip greens as a cover crop, control vine weevil. *Raspberries:* breeding, variety trial, wing without support, resistance to witches' broom. *rries:* variety trials, sprays to prevent cracking. *hes:* control of leaf curl. *Apples:* control of iew and scab. *Vegetables:* variety trials with ragus, beans (*Phaseolus* and *Vicia*) and tomatoes; control in asparagus; tomato breeding; endive uring; control of whiptail in cauliflower.

. INDIAN COUNCIL OF AGRICULTURAL RESEARCH.
Annual Report of the Indian Council of Agricultural Research for 1953/54, Delhi, 1956, pp. 189, Rs. 3.10 or 5s. 9d.

f notes are made on investigations or selections h concern the following horticultural crops: goes at Saharanpur and Hyderabad Fruit Research ions; citrus in Madhya Pradesh, Assam, the ab, Uttar Pradesh and Hyderabad; bananas at the tral Banana Research Station, Aduthurai, with -stations at Ganeshkhind and Chinsura; custard les at Hyderabad; vines at Hyderabad; guavas at aranpur and Hyderabad; papaws at Saharanpur; nuts in Kashmir; tomatoes and okras in Bombay Uttar Pradesh; eggplants, onions, paravals, pump-, musk melons and cauliflowers in Uttar Pradesh many leafy vegetables in Bombay; pepper (*Piper* cardamoms, chillies and ginger in Madras; onin-yielding artemisias in Chakrata Cantonment.

. MADRAS AGRICULTURAL DEPARTMENT.
Administration Report of the Agricultural Department for the year 1954-55, Madras, 1956, pp. 288, illus., Rs. 5.

icultural entomology: Resistance of sugar cane eties to the borers *Chilotraea* and *Proceras* spp.; *nocloa colona* as an alternative host of *Proceras*. *cultural mycology:* Stem-break of areca palms was ated by very great temperature fluctuations on the h-west sides of the trunks facing the afternoon sun, resulting lesions being invaded by several parasitic i. Spraying trunks with bordeaux mixture, cially if acid, accentuated the damage, but painting ks with zinc white gave some protection. Foliar spraying with Zn, Mg, B or all 3 improved the general condition of the crowns, especially where band disease was evident. Transmission tests failed to show that a virus was the causal agent of band disease. *Crop improvement work:* Castor bean, coconut, areca palm, safflower and oysternut (*Telfairia pedata*) variety trials; sugar cane variety and manurial trials; mango pruning and rootstock selection; breeding of mandarin and banana; apple varieties and rootstocks; plum rootstocks and hormone sprays for increasing yield; rootstocks for peach, jackfruit, annonaceous fruits and sapota (sapodilla); pineapple flowering advanced by growing-point treatment with ice-water and calcium carbide, and propagation from stem slices; papaya breeding; cashew propagation (successful marcotting with various media in place of moss, also grafting methods) and studies on fruit set; pepper breeding and side grafting; cultural factors affecting ginger yields; nutmeg and clove propagation by inarching.

4022. NYASALAND.
Annual Report of the Department of Agriculture for the year 1955/56 (Part II), 1957, pp. 96, 4s.

Tung: buddings *vs* seedlings, clonal trials, fertilizers, biennial bearing, tung oil composition. *Dark, flue-cured, burley and Turkish tobacco:* variety trials, fertilizer and cultural trials, rotations. *Coffee:* cultural (mulch and shade) and manurial trials, arabica fertilizer trial. *Fruit:* trials with granadillas, strawberries, youngberries, tree tomatoes and feijoas. *Agricultural Chemist:* tea and tobacco soils, dieback of coffee, leaf analysis of tobacco. [For tea see *H.A.*, 27: 2964.]

4023. ROTHAMSTED (LAWES AGRICULTURAL TRUST).
Report of the Rothamsted Experimental Station for 1956, Harpenden, 1957, pp. 280, 10s.
Results of the field experiments 1956, Harpenden, 1957, pp. 117, 5s.

The main items of horticultural interest are abstracted separately. The report also covers work on plant viruses, effects of time and temperature on the action of contact insecticides, biological control of *Aphis fabae* and results of trials of the German variety (Topine) of Jerusalem artichoke.

4024. UNIVERSITY OF NOTTINGHAM.
Report of the School of Agriculture, University of Nottingham, 1956, 1957 pp. 81, bibls, illus.

Progress in the various research projects is briefly summarized, and is followed by a series of short papers on some aspects of the work. Those of horticultural interest include "A basis of timing crop irrigation" by J. P. Hudson [see *H.A.*, 26: 4292], and "The relationship between the raspberry shoot and its environment" by I. H. Williams [see *H.A.*, 26: 2520].

4025. WELLESBOURNE.
Seventh Annual Report of the National Vegetable Research Station, Wellesbourne, 1956, 1957, pp. 79.

Brief reports of work in progress are presented for each of the 8 sections. Papers on beetroot varieties and the cabbage stem weevil have been abstracted separately.

4026. Western Samoa.
Annual Report of the Department of Agriculture, W. Samoa, for 1956, Apia, 1957, pp. 62.

An account of routine operations which concern, among other crops, bananas, cacao, and coconuts including field control of the rhinoceros beetle. Colonies of the parasitic wasp *Scolia ruficornis* introduced from Zanzibar in 1941 have been noted in several places, which indicates that it is established and spreading.

New periodicals.

4027. Bundesforschungsanstalt für Rebenzüchtung Geilweilerhof [Husfeld, B., Editor].
Vitis [*Vitis*], 1957, Band **1**, Heft 1, Bundesforschungsanstalt für Rebenzüchtung Geilweilerhof, Landau/Pfalz, pp. 56, illus., DM 3 per single number, irregular.

The journal is devoted to the publication of original papers and critical reviews in the fields of vine breeding, viticulture and oenology and of basic work related thereto. This first number contains seven papers, several of which are abstracted separately in this number of *H.A.*

4028. Office de la Recherche Scientifique et Technique Outre-Mer.
Café, Cacao, Thé [*Café, Cacao, Thé*], 1957, Vol. **1**, No. 1, pp. 53, illus., from Service "Café, Cacao, Thé", 45 bis, Avenue de la Belle-Gabrielle, Nogent-sur-Marne (Seine), 750 fr. per year in France, 900 fr. abroad.

The publication of this new journal, issued as a supplement to *Agronomie Tropicale*, is intended to focus the attention of commerce and agriculture on the industrial exports of French overseas territories. Results of French work and reviews of foreign studies will be included, as well as various aspects of commercial marketing. This first number contains review and research articles, notes on production and consumption of coffee and cacao, a market review for 1956 and statistics for world cacao bean production for 1954–55 and 1956–57. Three numbers are promised for 1957.

Noted.

4029.

a *Amateur Gardening Handbooks,* issued by Collingridge, London, 1957, pp. 92 each, illus., 4s. each.
Flawn, L. N., **The garden frame** [No. 27].
Poole, S. J., **Garden planning** (No. 32].

b Argentina.
Progreso realizado en las investigaciones agrícolas en al campaña 1954–1955. (**Progress in agricultural investigations during the period 1954-1955.**)
Idia, 1956, Nos. 106/8, pp. 304, illus.
Relevant items are abstracted or noted separately.

c Canada Department of Agriculture.
Annual Report of the Director, Experimental Farms Service, Department of Agriculture, Ottawa, Canada, 1955-1956, pp. 44, illus.
Part of the report abstracted in *H.A.*, 27: 1982.

d Canada Department of Agriculture.
Report of the Director of Science Service for the year ended March 31, 1956, Ottawa, 1957, pp. 73.
Reprinted from the Report of the Minister of Agriculture [see *H.A.*, 27: 1982].

e Cornell.
69th Annual Report Cornell University Agricultural Experiment Station 1955-1956, 1956, pp. 132, bibls.
Extension work; research projects merely listed.

f FAO.
Yearbook of Food and Agricultural Statistics, 1956, Vol. X, Part I, Production, pp. 456 [English and French with Spanish glossary], Rome, 1957, $3.50 or 17s. 6d.

g FAO.
Report of the first meeting of the European Contact Group on the uses of isotopes and radiation in agricultural research, held at Wageningen, Netherlands, 10-14 December 1956, pp. 39 (cyclostyled).
Mainly an outline of work in progress in individual European countries.

h Imperial College of Tropical Agriculture.
Report of the Governing Body and the Principal's Report for 1955-56, St. Augustine, Trinidad, and 40, Norfolk Street, London, W.C.2, 1957, pp. 56.

i I.R.S.I.A.
Comité d'application des méthodes isotopiques aux recherches agronomiques. Rapport 1955–1956. Section de Gembloux. (**Committee for application of isotopic methods to crop research. Report for 1955-1956. Gembloux section**), pp. 127, bibls.
Four papers abstracted separately.

j Kansas.
17th Biennial Report of the Director, Kansas Agricultural Experiment Station, Manhattan, 1952-1954, 1955, pp. 47.
A list of projects and publications.

k Macself, A. J. (revised by A. G. L. Hellyer).
The amateur's greenhouse.
Collingridge, London, 4th edition, 6th impression, 1957, 9×6 in., pp. 302, illus., 21s.
For review of the 5th impression of this useful manual see *H.A.*, 22: 4514.

l N.A.A.S.
Experiments in horticulture in progress at experimental horticulture and demonstration stations, October, 1956-September, 1957, 1957, pp. 119.
Lists showing crop, type and object of study, location and treatments.

m NATIVIDADE, J. V. (translated by J. DA C. MONTEIRO AND A. METRO).
Subericulture. **(The cultivation of cork oaks.)**
École nat. Eaux et Forets, 14, rue Girardet, Nancy, 1956, 10×6½ in., pp. 303, bibl. 370, 80 plates, 2,000 fr.
A French edition, brought up to date, of the Portuguese *Subericultura* [see *H.A.*, 21: 2130].

n NEW YORK STATE.
75th Annual Report New York State Agricultural Experiment Station, Geneva, 1956, 1957, pp. 24.
List of publications, projects, grants, appropriations, etc.

o NIGERIA.
Annual Report of the Department of Agriculture, Western Region, for the year 1952-53, 1957, pp. 49, 9d.

p ROSEMAUND (N.A.A.S.).
Farm Guide Rosemaund Experimental Husbandry Farm, 1957, Preston Wynne, Hereford, pp. 53.
Including hop management, manuring and picking trials.

q SARAWAK. (COOK, J.)
Annual Report of the Department of Agriculture for the year 1956, 1957, Government Printer, Kuching, pp. 36.

r SCOTLAND, DEPARTMENT OF AGRICULTURE.
Agriculture in Scotland. The Report of the Department of Agriculture for Scotland for 1956.
H.M. Stationery Office, Edinburgh, 1957, pp. 106, illus., 5s.

s SOMALILAND.
Annual Report, Department of Agricultural and Veterinary Sciences, 1956, pp. 44.

t SOUTH AUSTRALIA.
Annual Report of the Board of Governors of the Botanic Garden, South Australia, 1955-56, Adelaide, 1956, pp. 19, illus.

u SOUTH AUSTRALIA.
Report of the Minister of Agriculture for the year ended 30th June, 1955, pp. 67.
Horticultural research summarized very briefly on p. 15.

v U.S. DEPARTMENT OF AGRICULTURE (ELTING, E. C.).
Report on the Agricultural Experiment Stations, 1955, 1956, pp. 23.

w WESTERN CANADIAN SOCIETY FOR HORTICULTURE.
Report of Proceedings of the 12th Annual Meeting Western Canadian Society for Horticulture, Winnipeg, 1956, pp. 15.
Contains reports of committees.

INDEX

H.A. Vol. 27. No. 1.

N.B.—Brackets round the name denote that this person, although not the author, was directly or indirectly concerned with the article.

Abad Manrique, J. B., 66a, 181a, 576a
Abadía, A., 247
Abe, I., 539
Abraham, P., 669a
Addis, I. S., 582
Addy, S. K., 372
van Adrichem, M. C. J., 186
Adsuar, J., 576b
Agati, J. A., 636
Aglibut, A. P., 593
Aiazzi-Mancini, M., 838a
Alindada, R. C., 753
(Allen, E. F.), 841
Allen, H. P., 366
Alvarez Martín, M. de los D., 669k
Alvey, N. G., 705
Alyamova, V. A., 346a
American Society for Horticulture Science, Committee on Vegetable Breeding and Varieties, 395
Anagnostopoulos, P. T., 819
Andersen, A. L., 467
Anderson, H. W., 953
Anderson, L. C., 146
Andeweg, J. M., 576c
Andrade, A. C., 803, 852
Andrews, F. W., 954
Andrews, P., 180
Anon., 10, 58, 66b, 207, 241a, 259, 346b, 348, 412, 515, 534, 576d, 601, 617a, 820, 838b, 882, 931, 950a, 950b
Antcliff, A. J., 223
Aono, H., 937
Apon, C., 617i
(Appel, O.), 976
Appleton, A. A., 388
Aref, H., 813
Arle, H. F., 390a
Armstrong, W. W., 769, 808
Army, T. J., 499
Aronoff, S., 404
Artem'ev, G. V., 400
Artjušenko, Z. T., 695
Arvidsson, L., 4
Asahira, T., 701
Ashcroft, R. T., 459
Ashmawi, H., 813
Ashton, F. M., 921
Ashton, T., 974
Asociación Peruana de Ingenieros Agrónomos, 981
Asselbergs, E. A., 159
Athenstädt, H., 256
(Audia, W. B.), 31
Audus, L. J., 978
Austin, M. D., 314
Australia, Commonwealth Scientific and Industrial Research Organization, 68, 227, 578, 985
d'Auzac, J., 950h
Avramov, L., 232
Avundžjan, E. S., 14
Awatramani, N. A., 587

Bac, S. M., 108
Baccolo, S., 326
Bain, J. M., 174
Baines, R. C., 838c
Bald, J. G., 702
Baldassari, T., 116
Baldini, E., 77, 82
Ball, E., 742a
Ballatore, G. P., 450
Banerjee, A. K., 669b
Banga, O., 495
Baptist, B. A., 943
Barbados, B.W.I. Central Sugar Cane Breeding Station, 907
Barber, G. A., 441
Barham, W. S., 445
Barker, J. S., 317
Barnhart, D., 742x
Barrat, J. G., 254
Barrau, J., 947
Barrett, H. C., 241b
Barrons, K. C., 360
Barrows, H. L., 66c
Bartolome, R., 950c
Barton, L. V., 111
Barua, D. N., 936
Baruah, H. K., 951n
Bastia, C. M., 742b
Basu, S., 847
Beakbane, A. B., 94
Beal, J. M., 461
Beard, F. H., 648
Beatty, R. H., 390b
Beaufils, E. R., 902
Beaumont, A., 955
Beaumont, J. H., 876
Becker, G., 982
Beecher, F. S., 447
Beeftink, W. G., 141
Beke, F., 632
Belavin, Ju.A., 133
Bell, H. K., 252
Bell, L. N., 66d
Benberg, O., 241c
Benedict, H. M., 7
Benemerito, A. N., 838d
Bennet-Clark, T. A., 978
Bennetts, H. W., 963
Bensa, S., 742c
Berg, W., 576e
Bernardo, F. A., 635
Bernstein, L., 460
Berrie, G. M., 384
Berrill, F. W., 850
Best, R. H., 1
Bhagavan, H. N., 950d
Bhat, N. R., 587, 617b
Białobok, S., 66e, 742d
Bickley, W. E., 568
Bienaymé, A., 665
Bimantoro, R. R., 742n
Bindra, O. S., 507
Bingham, F. T., 760
de Bioxo, —., 199
Bird, I. F., 98
Black, D. T., 407
Blackhurst, H. T., 182
Blaha, J., 222
Blair, D. S., 105
Blank, H. G., 165
Blankwaardt, H. F. H., 742e
Blanpied, G. D., 173
Bocanegra Salazar, S., 576f
Boccanera, G., 822
Bócsa, I., 632
Boelema, B. H., 557
Bohart, G. E., 491
Böhm, O., 730
Bois, E., 685
Boll, P. M., 660
Bollaerts, D., 346d
Bollard, E. G., 11
Bonner, J., 978
Bonnet, J. A., 914
Boosalis, M. G., 469
Bordeleau, R., 352
Bormann, F. H., 42
Bosher, J. E., 186
Bošković, M., 275
Botham, J. R., 838e
Bottelier, H. P., 29, 30
Bouscary, A., 742f
Bovay, E., 214
Bowen, T. J., 250
Bowers, F. A., 671
Boynton, D., 142, 146
Braak, J. P., 50, 492
Brabec, S., 93
Braconi, L., 825
Bradley, M. V., 92
Brancker, A. V., 5
Brase, K. D., 346j
Brasher, E. P., 415
Breazeale, E. L., 143
Breider, H., 213
Brekke, J. E., 449
Bremer, A. H., 394
Brett, C. H., 470
Breviglieri, N., 116

Brichet, J., 838f
Brierley, P., 738
Brimblecombe, A. R., 950e
Bringhurst, R. S., 838g
British West Indies Sugar Association, 906
Broeshart, H., 891
Brook, P. J., 561
Browicz, K., 742g
Brown, M. S., 191
Brown, R. T., 835
Browne, F. S., 380
Broyer, T. C., 66f, 547
Brubaker, R. W., 470
van den Bruel, W. E., 346d
Bruni, B., 241d
Buchta, V., 181b
Bugała, W., 742g, 742h
Bull, R. A., 893
Bunt, A. C., 66g
Burger, J. J., 787
Burke, J. H., 744, 838h
Burkholder, C. L., 181c
Burnaeva, N. L., 772
Burrell, A. B., 142
Busch, J., 874
Bush, R. G. W., 979
Butler, C. G., 65
Butters, R. E., 538
Buzacott, J. H., 922
Buzzel, A., 617c
Byass, J. B., 345
Byrde, R. J. W., 904

Cabo Torres, J., 669c, 669d, 669e, 670f
Cabrera, T. E., 634
Cahoon, G. A., 838i, 839m
Cain, J. C., 181d, 843
Caiyod, D. T., 749
Caldwell, J., 171
California Department of Agriculture, 983
Callaghan, J. J., 36
Camp, A. F., 839k, 844
Campbell, J. A., 576g
Campbell, J. D., 661
del Campo, E., 838j
Canada Department of Agriculture, 3
Canova, A., 505
Capo, B. G., 908
Caprio, J. M., 764
Carangal, A. R., Jr., 638, 669f, 950f, 950g
Carden, P. W., 655
Carleton, W. M., 383
Carlotti, G., 279
Carlson, A. E., 387
Carman, G. E., 791
Carncross, J. W., 512
Carolus, R. L., 453
Carpenter, W. J., 721, 739
Carreras Matas, L., 669q
Carter, G. H., 343
Cartwright, R. A., 946
Casarini, B., 296
Casilli, O., 346e
Castillo, B. S., 636
Catambay, A. M., 638, 950f
Cathey, H. M., 735
Cavalloro, R., 612
Cavazza, L., 480
Cejtlin, M. G., 221
Çendaña, S. M., 782
Česnokov, V. A., 403, 527
Ceylon, Director of Agriculture, 984
Chacravarti, A. S., 923
Chaland, E., 838k
Chanasyk, V., 346f
Chandra, V., 624
Chapman, H. D., 759
Chapman, H. W., 66h
Chapman, P. J., 312
Chapot, H., 838l
Chappell, W. E., 376
Charavanapavan, C., 896
Charpentier, L. J., 927
Chase, J. L. H., 956
Chater, G. P., 653
Cheema, G. S., 742i
Chen, K. H., 853
Cheng, S.-Y., 952b
Chichester, C. O., 67i
Childers, N. F., 251, 252
Ching, F., 718
Chippindale, H. G., 649
Chittenden, A. E., 666
Chittenden, E., 145
Christopher, E. P., 181t
Ciccarone, A., 821
Çiferri, R., 595
Čikalov, P. M., 722
Clark, F., 589
Clark, J. E., 66s
Clark, P. J., 344
Clausen, C. P., 346g
Clauss, B., 678
Clayton, E. E., 584
Clos, E. C., 572
Cloutier, B., 742j
Cobley, L. S., 957
Coconut Research Institute, Ceylon, 861
(Cohen, G.), 742k
Cohoon, D. F., 288
Coles, G. V., 904
Coll, E. E., 950r
Collins, W. B., 351
Collyer, E., 346h
Comar, C. L., 958
The Commercial Grower, 1003a
Commonwealth Economic Committee, 662, 840
Commonwealth Scientific and Industrial Research Organization, Australia, 68, 227, 578, 985
Comuzzi, A., 241i, 241j, 303
Connecticut Agricultural Experiment Station, (Storrs), 1003b
Constable, D. H., 903
Converse, R. H., 304
Cook, R. L., 456
Cooke, F. C., 869
Cooke, R. E., 812
Coombe, J., 51
Cooper, A. J., 690
Cooper, H. P., 422
Coote, G. G., 807
Copet, A., 945
Corke, A. T. K., 285
Corrales Macedo, A., 540
Correll, F. E., 131
Cosmo, I., 235, 241e, 241f, 241g, 241h, 241i, 241j, 270, 295, 300
Costantino, G., 838m
Coste, A., 771
Coulson, J. G., 426
Coulter, L. L., 360
Cox, E. H. M., 959
Cox, P. A., 959
Cox, R. S., 434, 562
Crafts, A. S., 390c
Crane, J. C., 92, 128
(Crane, M. B.), 979
Crénin, C., 950h
Cressman, A. W., 793
Criddle, W. D., 66i
Cripps, E. G., 651
Crocker, A. J., 747
Crocomo, O. J., 576h
Cromwell, B. T., 669g
Cropley, R., 266
Crosby, E. A., 152
Crosby, T. S., 742l
Crossa-Raynaud, P., 72, 84, 181e, 241k
Crowdy, S. H., 15, 16, 950i
Crowe, A. D., 142
Cruz, E. E., 637, 640
Cruzado, H. J., 901
Cumber, R. A., 866
Curtis, O. F., Jr., 312

Daines, R. H., 288
(Dalbro, K.), 249
Dalgliesh, C. E., 63, 66j
Dallyn, S. L., 488
Dalmasso, G., 241l
Daniel, W. H., 390d, 710
Dark, S. O. S., 646
Darling, H. S., 654, 670p
Darlot, —., 66k
Darrow, G. M., 183, 241m
Daulton, R. A. C., 583
Davidson, J. H., 307
Davidson, O. W., 712
Davis, J. F., 481
Davis, R. R., 709
Davison, R. M., 120, 121, 124, 558, 559, 560
Day, B. E., 364
Deering, R. B., 742m
Delanoue, P., 471
Della Bella, D., 316
Denisen, E. L., 190
Dennison, R. A., 571
Department of Agriculture for Scotland, 576i
Dermine, A., 181f
Desmarest, J., 665
Deullin, R., 851
Deutsch, M., 576j
Dickson, A. G., 95, 96
Dickson, R. C., 838n
Dieter, A., 475
Dieter, C. E., 307
Digby, M., 54
Dijksterhuis, H. P., 262
Di Martino, E., 781, 783, 790
Dimond, A. E., 577o
van Dinther, J. B. M., 859
de Dios, V. Y., 427
(Dippenaar, B. J.), 784
Di Prima, S., 838o
Directie van de Landbouw, 's-Gravenhage, 986
Dirlbek, J., 620
Diseker, E. G., 390e

Ditman, L. P., 417, 568
Ditmer, W. P., 617d
Djurdjević, B., 278
Dobroljubskij, O. K., 220, 543
Dobrovoda, K., 241n
Dobrowolski, M., 951j
Dobson, R. M., 576k
Dodillet, H.-J., 436
Dohnal, T., 241o
Domanskaja, Ė. N., 119
Dominick, C. B., 609
Domokos, J., 196
Dorado Bernal, E., 669h, 669i, 669j, 669k
Dorf, P., 960
Dorta, J., 617e
Dotti, F., 139
Douglas, J., 742n
Douglas, J. W. E. H. S., 912, 950k
Douglass, J. R., 486
Dovaston, H. F., 686
Dragaš, M., 232
Dragavcev, A. P., 110
Drake, M., 661
Drolsom, P. N., 617m
Drosdoff, M., 66c
Drozd, A. M., 576l
D.S.I.R., London, 987
D.S.I.R., New Zealand, 90, 164, 586, 650, 750, 995
Dumas, M., 346r
Dupont, L., 873
Dupriez, G., 888
Dürr, H. J. R., 320
Dutt, A. K., 34
Dutta, S. K., 847, 950l
Dutton, R. W., 63, 66j
Dye, D. W., 276
Dye, M. H., 277
Džamić, M., 177

Eaks, I. L., 443, 444
Eaves, C. A., 175
Echandi, E., 878
Eddy, B. P., 668
Edgar, E. C., 315
Edgerton, L. J., 122
Edinburgh School of Agriculture, 1003c
Eguchi, T., 424
Ela, R. M., 780
Elias, R. S., 950i
Ellison, J. H., 413, 416
Elstad, V. B., 21
Embleton, T. W., 757, 758, 838p
Emiliani, G., 297
d'Emmerez de Charmoy, A., 576m
Emmert, E. M., 576n
Emmert, F. H., 41
Endrigkeit, A., 431
English, W. S., 291
Erickson, L. C., 775
Escritor, M. L., 862
European and Mediterranean Plant Protection Organization (EPPO), 336
Eusebio, J. A., 593
Evans, H. J., 474
Everett, C. F., 351
Everett, H. F., 267
Evers, E., 950m
Evreinoff, V. A., 838q

Facultad de Agronomía de la Universidad Nacional de Tucumán, 1000
Fairbank, H., 66m
Fairfield Experimental Horticulture Station (N.A.A.S.), 66n
FAO (Food and Agriculture Organization), 988
Farrar, R. F., 645, 647
Fassi, B., 905
Fenili, G. A., 328
Ferenczi, S., 197
Ferenczy, L., 657
Fergus, I. F., 849
Ferguson, W., 380
Fernández de Bobadilla, G., 961
Fernandez, N., 617i
Fernando, H. E., 860
Ferrand, M., 950n
Ferraris, I. P., 918, 919
Fertig, S. N., 711, 864
Fidler, J. C., 979
Fiji Department of Agriculture, 1003d
(Fink, H. C.), 723
Finlayson, D. G., 484
Fischer, H., 742o
Fisher, H. H., 733, 742p
Fisher, J. R., 359
Fjäderhane, A. M., 4, 71
Fjelddalen, J., 483
(Fleschner, C. A.), 785
Fletcher, F. W., 797
Fletcher, G., 345
Flippin, R. S., 854
Flock, R. A., 838n
Flocker, W. J., 405
Floor, J., 726
Florida Agricultural Experiment Stations, 989
de Fluiter, H. J., 269
Foda, H. A., 37
Foglino, F., 669l
Foote, F. J., 838c
Foottit, R. L. C., 742q
Forbes, A. R., 498
Ford, H. W., 796
Foresti, B., 838r
de Forges, L., 66o
Forshaw, J. E., 669m
Foschi, S., 279, 287, 311
Foster, A. C., 411
Fourie, S., 19
Fourmont, R., 181g
Francia, F. R., 749
Frankel, R., 692
French, B. C., 55
Friedrich, G., 85, 99, 346i, 962
Fritz, D., 552
Fritzsche, R., 280
Fry, P. R., 497
Fudge, O. L., 356
Fukuda, J., 331, 779, 786, 788, 792
Fukunaga, E. T., 876
Fuller, J. C. E., 389
Fuller, W. H., 405
Furr, J. R., 769, 808

Gabelman, W. H., 511
Gagnard, J-M., 771
Gallardo Villá, M., 669o
Gallay, R., 214
Gallegly, M. E., 576o
Gallego y Gómez, F., 661, 669n, 669r, 669s, 669t, 669u
Gallo, G., 576p
Gallucci-Rangone, M. M., 284
Galston, A. W., 978
Galun, E., 439
Galvez, N. L., 838s
Gammon, N., Jr., 238
Gangolly, S. R., 865
Garcia, A. C., 640
Garcia, G. M., 576q
Garcia Marquina, J. M., 669o
García Tapia, M. del P. P., 669d, 669e
Gardner, C. A., 963
Garman, P., 244
Garmany, H. F. M., 581
Garofalo, F., 565
Garoglio, P. G., 219
Gartenwelt, 49
Gault, S. M., 964
Gayed, S. K., 466
Gelderblom, J. P. B., 557
(George, E. J.), 263
Georghiou, G. P., 826, 838t
Geraldson, C. M., 546
Gerlach, C. S., 742r
Gerretsen, F. C., 47
Gerritsen, C. J., 87, 240
Ghosh, C., 669b
Giang, P. A., 417
Gilmer, R. M., 346j
Gil Quinza, S., 664
Ginoza, W., 617t
Giovannozzi-Sermanni, G., 597, 598
Girard, —., 756
Giráu Bach, L., 669p
Glasscock, H. H., 291
Glover, P. M., 950o
Godan, D., 742s
Godoy, C., Jr., 950p
Gomes, J., 881
Gómez Carcedo, F. S., 622
Gonzalez, L. G., 487, 749, 751, 753
González Alonso, M., 438, 628
González Gómez, C., 661, 669q, 669r, 669s, 669t, 669u
González Sicilia, E., 748
Goode, J. E., 181h
Goode, P. M., 293
Goodman, R. N., 476
Goosen, R. J., 241p
Gordon, S. A., 978
Gould, H. J., 569
Gowing, D. P., 897
Graner, E. A., 950p
Grangier, A., Jr., 877
Graniti, A., 828
Gray, A., 66p
Gray, E. G., 267
Greenham, D. W. P., 181i
Gregory, P. J., 950q
Gretton, R. H., 54
Grevet, —., 66q
Grierson, W., 800
Griffin, D. E., 713
Griffiths, A., Jr., 731
Griggs, W. H., 114, 127
Grimaldi, A., 591
Grogan, R. G., 504
Groh, W., 85
Grooten, R., 76

Grootenhuis, J. A., 47
Gropp, A. H., 66c
Grosclaude, C., 290
Grosjean, J., 346k
Grosso, J. J., 608
Gualaccini, F., 556
Guilbeau, W. F., 950r
Guillou, R., 169
Gunaratnam, S. M., 950w
Gupta, P. S., 617f
Gupta, S. L., 346l
Gurr, E., 1003e
Gustafson, F. G., 458
Guthrie, F. E., 613
Guyer, G. E., 467
Guzman, V. L., 375

Haas, A. R. C., 775
Hačatrjan, S. S., 203
Hafen, L., 518
Haigh, J. C., 65
Hall, C. B., 571
Hall, E. E., 422
Hall, J. A., 334
Hall, J. W., 241q
Hall, W. C., 526
Halliday, D. J., 965
Halsey, H. R., 742t
Hamilton, R. A., 895
Hammar, H. E., 239
Hammarlund, A., 381
Hammer, A. L., 728
Hamner, C. L., 456, 718
Hamner, K. C., 35
Hampl, J., 216
(Hamson, A. R.), 551
Hanger, F., 742u
Hanna, A. D., 858
Hansen, C. J., 305
Hansen, E., 147
Hanson, N. S., 367
Harada, R., 140
Hardenburg, R. E., 161, 801
Harding, R. B., 838i
Harler, C. R., 950s, 966
Harley, C. P., 134, 135
Harmon, F. N., 211, 212, 273
Haroldsen, E. O., 551
Harries, F. H., 472
Harris, E., 66r
Harris, H. C., 589
Harris, R. W., 127
Harrison, B. D., 268
Harrison, F. P., 568
Harrison, I. R., 713
Hasdenteufel, J.-E., 839l
Hauck, F. W., 950t
Hauser, E. W., 370
Hawthorn, L. R., 491
Hay, J. R., 353
Hayashi, K., 477
Hayashi, S., 264
Hayslip, N. C., 562
Heath, O. V. S., 66s
Heatherington, W., 858
Heeger, E. F., 967
Heggestad, H. E., 608
Hellyer, A. G. L., 990
Hendrickson, A. H., 149
Hendrickson, R., 838w
Hering, M., 206
Hermoso, C. E., 749
Hernandez, E., 251
Herrero, J., 97
Hervey, G. E. R., 429
Hess, C. E., 727
Hesse, C. O., 305
Heuberger, J. W., 281
Hewitt, E. J., 549, 893
Heydecker, W., 62
Heymann-Herschberg, L., 763
Hidalgo, L., 209
Hikichi, A., 334
Hildebrand, R. P., 626
Hilton, R. J., 541
Hirt, W., 258
Hitchcock, S., 337
Hitz, C. W., 191
Hłyń, M., 255
Hoare, E. R., 49, 60, 66t, 66u
Hoblyn, T. N., 86, 857
Hodgson, R. W., 838u
Hoed, J., 643
Hoffman, M. B., 122
Holttum, R. E., 742v
Honda, S. I., 17
Hondelmann, W., 742w
Honma, S., 419
van Hoof, H. A., 489
Hopkins, J. C. F., 968
Hord, H. H. V., 854
Horn, N. L., 346m
Horsfall, F., Jr., 346n
Hotin, A. A., 631
Hough, L., 179, 180
Hovadík, A., 659
Howard, H., 66v
Howard, H. D., 868
Hu, C. C., 838v
Huang, C. R., 898
Huber, H., 241z
Huberty, M. R., 768
Hudson, J. P., 61
Hughes, D. T., 474
Hulme, A. C., 181k
Hulshof, H. J., 151
Hunnam, D., 345
Hunter, H. S., 617g
Hunter, J. H., 239
Hussein, A. El A., 813
Hutcheson, T. B., Jr., 592
Hutchison, F. W., 904
Huyke, A. S., 951s

Ibáñez Martín, M. L., 669n
Idle, D. B., 64
Ildis, P., 799
Imperial Chemical Industries Ltd., 1001
Incze, F., 688
Inden, T., 536
Institut pour l'Encouragement de la Recherche scientifique dans l'Industrie et l'Agriculture, Brussels (I.R.S.I.A.), 992
Institut National de la Recherche Agronomique (INRA), 346o
Institute of Brewing Hops Advisory Committee, 644
Instituut voor Toegepast Biologisch Onderzoek in de Natuur, Arnhem, 261
Intengan, C. L., 66w
International Potash Institute, 991
Isherwood, F. A., 178
Ishigaki, K., 939
Ishihara, M., 140, 755
Ito, H., 440
Ivanoff, S. S., 435
Ivimey-Cook, W. R., 973
Iwakiri, B. T., 114, 127
Iwasaki, T., 773, 774
Izquierdo Tamayo, A., 617h

Jacks, H., 344, 433, 463, 497
Jackson, W. T., 594
Jacoboni, N., 257
Jacobs, A., 157
Jakovlev, P. N., 83
Jakuškina, N. I., 532
Jammar, M., 945
Jankiewicz, L., 129
Janko, P., 643
Jary, C. I., 649, 653
Jasmin, J. J , 380
Jefferson, R. N., 677, 702
Jennings, E. A., 940, 941
Jensen, H., 310
Jensen, J., 576r
Jensma, J. R., 969
Jepson, W. F., 928, 950u
Jermyn, M. A., 178
Jiménez-Cuende, F., 66x
(Joachim, A. W. R.), 984
Johnson, B. L., 681, 742x
Johnson, C. M., 547
Johnson, S. P., 526, 530
Johnston, C. J. R., 742y
Jones, D. R., 15, 16
Jones, J. R. D., 576t
Jones, W. W., 758, 759, 838p
de Jong, D. J., 346p
Joshi, G. K., 669v
Jovićević, B., 278
Júarez Galiano, L., 540
Judenko, E., 858
Juliano, B. O., 950v
Juneja, S. L., 577h
Junusov, S. Ju., 378
Juras, I., 74, 75

Kabulov, D. T., 378
Kačova, M., 656
Kagawa, A., 576s
Kalra, G. S., 545
Kamemoto, H., 679
Kantorovič, A., 970
Kaplan, L., 448
Kapoor, L. D., 629
Karash, C. B., 242d
Karmanov, V. G., 765
Karnatz, H., 101, 104
Kárpáti, Z., 73
Kaszonyi, S., 410
Kaufman, J., 801
Kawai, S., 939
Kazarjan, V. O., 14
Keegel, E. L., 950w, 971
Kefford, R. O., 576t
Keitt, G. W., 576w
Kemmer, E., 70
Kennard, W. C., 621, 884, 885
Kenworthy, A. L., 136
Kern, H., 553
Kerr, A., 742z
Kessler, H., 176
Kesterson, J. W., 838w
Kettner, H., 181l

Khanna, K. L., 923, 925
Kho, Y. O., 492
Kienholz, J. R., 283
Kilby, W. W., 833
Killian, C., 452
Kinch, D. M., 383
King, D. R., 318
King, K. M., 498
King, N. J., 950x
Kiplinger, D. C., 737
Kirk, L. K., 687
Kirkpatrick, J. D., 758
Kišon, A., 228
Klein, W. H., 21
Klešnin, A. F., 402, 501, 674
Klingbeil, G. C., 241r
Klingman, G. C., 361
Klinkowski, M., 340
Knorr, L. C., 777
Knust, H. G., 930
Kohl, H. C., Jr., 720
Köhler, H., 280
Kolářík, J., 215
Kolenbrander, G. J., 47
Konlechner, H., 233
Korbonits, A., 516, 522
Koremura, M., 792
Kormos, J[ózsef], 519, 520
Kormos, J[ózsefné], 519, 520
Köster, P., 743a
Kostina, K. F., 119
Kováts, Z., 693, 696
Kozma, P., 200, 205
Krackenberger, H. F., 499
Kramer, S., 81
Krasinskij, N. P., 25
Kraus, V., 241s
Kreutz, W., 603
Krickl, M., 494
Krishnamoorthi, T., 617b
Krishnamurthi, M. N., 669w
Kristensen, H. R., 743b
Křivánek, V., 222
Kronenberg, H. G., 189
Krümmel, H., 85, 181m
Krüssmann, —., 743c
Krutikova, L. P., 633
Kulkarni, L., 66y
Kumar, K., 531
Kurihara, A., 755
Kursanov, A. L., 26
Kvíčala, A., 508

Lacombe, R., 241t
Lacson, M. V., 950z, 951a
Lagasse, F. S., 834, 836
Lahtz, K., 706
Laíns e Silva, H., 950y
Laird, E. F., Jr., 838n
Lake, J. V., 107
Lalatta, F., 80
Lambert, E. B., 576u
Lange, A. H., 876
La Rotonda, C., 542
Larsen, R. P., 217
Larson, P., 978
Lasheen, A. M., 182
Lauffer, M. A., 617c
Laumeister, L. T., 382
Laurent, R., 66z
Lauther, S., 49
Lautz, W., 606
Lawrence, W. J. C., 67n
(Lawson, F. R.), 610
Lear, B., 576v
Leben, C., 576w
(LeCompte, S. B., Jr.), 510
Lecrenier, A., 181n
Lee, L. A., 669x
Leefe, J. S., 349
Lehmann, E., 743d
Lehoczky, J., 694
Lehr, J. J., 44
LeLacheur, K. E., 350
Leman, V. M., 399
Leppik, E. E., 67a
Lesik, B. V., 633
Levitt, J., 972
Lewis, J. J., 669y
Lhoste, J., 346q
Li, K.-Y., 916
Liebster, G., 193, 243
Lienk, S. E., 312
van Lier, P. J., 151
Liger, P., 225
Liljedahl, J. B., 383
Limfat, E., 909
Lincoln, W. C., Jr., 617d
Lindgren, D. L., 791, 814
Lityński, M., 523
Liverman, J. L., 23, 526
Livingston, G. E., 194
Lizer y Trelles, C. A., 949
(Lock, G. W.), 642
Locsin, C. L., 919, 950z, 951a
Löhrke, L., 148
Long, W. G., 398
Longenecker, G. W., 743e
Lorentz, P., 738
Lott, W. L., 138
Loupe, D. T., 368
Louvet, J., 346r
Lovisolo, O., 286
Lownsbery, B. F., 305, 309
Lubatti, O. F., 713
Lucas, G. B., 585
Łucka, M., 187
Luckwill, L. C., 69, 979
Luickij, G. D., 298
Lumang, H., 617i
Luna Moreno, C., 181a, 669z
Lundberg, S., 346s
Lundstad, A., 716, 717, 719
Lupo, V., 323
Lutz, J. M., 801

Maatsch, R., 697, 698
MacArthur, M., 105
McAuliffe, C., 615
McCambridge, J. R., 355
McCarty, C. D., 364
McClung, A. C., 138
McClure, F. A., 670a
McCready, C. C., 549
McEwen, F. L., 429
McFaul, J. A., 676
McGeorge, W. T., 143
Machado S., A., 875
McIlrath, W. J., 544
McLean, R. C., 973
Madsen, H. F., 327, 338
Madueño Box, M., 670b
Maertens, C., 905
Mahdi, M., 831
Mahlstede, J. P., 687, 743f
Mai, W. F., 306
Maingonnat, A., 241u, 241v
Majumdar, G. P., 743g
Malaguti, G., 911
Malaviya, B., 34
Mallinjoud, H-M., 743h
Maltese, A. E., 289
Mándy, G., 600
Manickavasagar, P., 860
Mann, G., 56
Mante, W., 70
Manzanilla, E. B., 638, 669f, 950f
Manzo, P., 226, 235
Manzoni, L., 241w, 241x
Marais, P. G., 19
Marcelli, E., 617j
Mariotti, A., 915b
Markakis, P., 194
Markantonatos, A., 615
Marlatt, R. B., 506
Marsh, R. W., 346t
Martelli, G., 346u
(Marth, P. C.), 31
(Martin, H.), 979
Martin, J. P., 67b, 760, 838c, 838x
Martin, J. T., 904
Martin, L. F., 950r
Masiluñgan, V. A., 658
Massee, A. M., 314
Masuda, T., 477
Mathis, W. T., 136
Mathur, P. B., 886
Mathur, R. S., 951c
Matienko, B. T., 437
Mattarelli, D., 279
Matthews, W. A., 577e
Mattus, G. E., 123
Maughan, F. B., 317
May, P., 223
Mayer, L., 675
Mayer, R., 181g
van der Meer, F. A., 269
Mehlenbacher, R. J., 181d
Mei, A., 670c
Melville, G., 374, 390i
Mendes da Ponte, A., 951d
Mendiola-Ela, V., 639
Menon, A. K., 670d
Menon, K. P. V., 863, 951e, 951h
Merí, J., 805
Merrill, S., Jr., 835
de Mesa, M. U., 751
Mesquitela, J. C., 951f
Mezzetti, A., 346v
Michelbacher, A. E., 337
Mihajlov, K., 617k
Mihajlova, P. V., 204
Mijušković, M., 830
Milaire, H., 346w
Miles, M., 576x
Milinkó, I., 555
Miller, C. D., 845
Miller, C. O., 22
Miller, D. B., 838i
Miller, E. J., 136
Miller, E. V., 499
Miller, P. M., 292
Millikan, C. R., 743i
Minamikawa, J., 944
Ministry of Agriculture, London, 346x, 1002
Minnesota Agricultural Experiment Station, 1003f
Mirčetić, S., 830
Mirto, G., 450
Mississippi Agricultural Experiment Station, 993

Mitchell, J. W., 31, 461
Mitović, D., 208
Miyazaki, Y., 479
Moens, R., 346d
Moir, W. W. G., 913
de Mol van Oud Loosdrecht, W. E., 700
Monastero, S., 321
Mondoñedo, J. R., 617l, 619
Monnet, J., 851
Mook, K., 838y
Moon, H. H., 134, 135
Moore, E. L., 617m
Moore, J. F., 377, 449
Moore, R. C., 123
Moreau, M., 682
Moreton, B. D., 743j
Morettini, A., 195, 346y, 817, 824
Morgan, A. H., 192
Morgan, O. D., 605, 617n
Morgan, O. D., Jr., 604
Mori, H., 539
Morishita, F. S., 677
Morita, N., 935
Morris, L. G., 49, 66u
Morris, L. L., 443
Morris, M. P., 621
Mort, C. H., 818
Morton, D., 666
Moser, L., 231
Moškov, B. S., 401
Mostafa, M. A., 466
Mrva, J., 241y
Mueller, W., 856
Muhina, V. A., 938
Mühlmann, R., 346z
van den Muijzenberg, E. W. B., 49
Muir, R., 929
Mukerji, B., 623
Mukherjee, K. L., 531
Mukherjee, S. K., 951g
Mull, H. M., 385
Müller, H., 102
Murphy Chemical Company, 345
Murton, R. K., 347e
Muzik, T. J., 844, 901
Myers, J. M., 589
Myhre, A. S., 242c
Mynhardt, C. B., 787
Mysore Agricultural Department, 1003g

N.A.A.S., 66n
Nádasi, M., 732, 743k
Nakasone, H. Y., 671, 679
Nambiar, M. C., 865
Nanda, K. K., 35
Narasimhachar, S. G., 670e
Narvestad, K., 420
National Institute of Agricultural Engineering, 52
National Tôkai-Kinki Agricultural Experiment Station, 347a
Neilson, J. J., 357
Neiswander, R. B., 528
Nelson, K. S., 737
Nelson, S. H., 105
Nesterov, Ja., S., 109
Nettles, V. F., 571
Neubert, A. M., 343
Neve, R. A., 643, 645
Newhall, W. F., 800
Newhook, F. J., 558, 559, 560
New Zealand Department of Agriculture, 994
New Zealand Department of Agriculture, Horticulture Division, 181j
New Zealand, Department of Scientific and Industrial Research (D.S.I.R.), 90, 164, 586, 650, 750, 995
Nicol, H., 43
Nicolaisen, W., 552
Nielsen, J. P., 7
Nieman, R. H., 67c
Nieser, O., 743l
Nigeria Department of Agriculture, 1003h
Nikolaeva, M. G., 743m
Nirula, K. K., 867, 951e, 951h
Nishiura, M., 774
Nitsch, J. P., 978
Nixon, R. W., 809, 810, 811
Noll, C. J., 396
van Norman, R. W., 36
North, C., 67d
North-Coombes, F., 951i
Ností Nava, J., 669e, 670f
N.S.W. Department of Agriculture, Biological Branch, 265, 346c, 689, 699, 767
Nyasaland Department of Agriculture, 580, 832, 933, 996, 1003i
Nylund, R. E., 390f

Obordo, R. A., 951j
Ocfemia, G. O., 635
Odescalchi, M., 229
Odland, M. L., 396
Ogg, C. L., 669x
Ohlrogge, A. J., 67e
Okamura, T., 577g
Okudai, S., 331, 335
Oland, K., 144
Olejnik, M. M., 442
Ollagnier, M., 892
Opland, T. B., 144
Orellana, R. G., 844
Orihuel, G., 805
Orteza, E. M., 641
Osipova, O. P., 501
Ostapenko, V. I., 83
Østeby, A., 420
Otanes, F. Q., 636
Owen, E. B., 974
Oxenham, R. L., 464
Ozaki, C. T., 537

Paci, C., 181o
Paci, P., 451
Pag, H., 743n
Page, G., 310
Palfrey, G. D., 358
Palmer, J. K., 599
Palser, B. F., 544
Panadero Vidal, M., 670f
Pandalai, K. M., 863
Panigrahi, G., 742b
Parameswaran, S., 67f
Parent, B., 347b
Park, P. O., 940, 941, 942, 952c
Parker, K. G., 306
Parks, R. R., 169
Pasquier, J., 514
Passecker, F., 181p
Pattabhiraman, T. V., 872
Paul, V. J., 951k
Pavićević, B., 329
Peabody, D. V., Jr., 390g
Pearce, E. T. S., 929
Pearce, S. C., 6
Pearch, L. C., 345
Pearson, G. A., 460
Pehoto, L. T., 185
Pelle, C., 831
Pellegrini, G., 838z
Pelletier, R-L., 426
Pennisi, L., 839a, 839b
Pennsylvania College of Agriculture, 617o
Peral, M. T., 45
Peremans, L., 945
Perkins, D., 374
Perkins, H. J., 404
Perrot, —., 414
Peters, F. E., 951l
Petersen, H. I., 381
Petróczi, I., 576y
Peyer, E., 234, 241z
Philipse, W., 153
Phillips, D. H., 563, 564
Phillips, W. R., 126, 162, 168, 493
Picard, M., 736
Pieri, G., 271, 299, 301
Pillay, K. P., 627
Piñeiro, A., 746
Pirovano, A., 20, 210, 242a
Pitanza, M., 839c
Plaisted, R. L., 478
(Plant Protection Ltd.), 59
Plantenziektenkundige Dienst, Wageningen, 839d
van de Plasse, J. B., 158
Plavšić-Gojković, N., 392
Plock, H., 347c
Plumridge, A. J., 725
Poapst, P. A., 126, 162, 168, 493
(Poidevin, —.), 414
Poliakoff, J., 670g
Polsinelli, M., 241f, 241g
Porritt, S. W., 160, 163
Portilla, A., 574
Posnette, A. F., 266
Potter, G. F., 833, 835
Pouncy, A. J., 956
Powrie, W. D., 159
Prasad, R. S., 925
Pratt, P. F., 759
Prest, R. L., 457
Preston, A. P., 156, 181q
Preston, W. H., Jr., 461, 465
Prevot, P., 892
Pribavkina, R. A., 79
Pridham, J. B., 179
Pringle, J., 490
Priol, J., 115
Proctor, J. M., 473
Puccini, G., 680
Pumpjanskaja, S. L., 765
Purvis, C., 887, 890
Puttarudriah, M., 951m
Puzzi, D., 803, 852
Puzzilli, M., 617p, 617q, 617r

Quaas, R., 112
Quackenbush, G. G., 181s
Quaid, G., Sr., 929
Quartley, C. E., 577m

Rabb, R. L., 613
Rabe, W., 282
Raciti, G., 762, 839e, 839j
Rademacher, B., 390h
Radha, K., 951h
Raeber, J. G., 617s
Raggio, M., 38
Raggio, N., 38
Raghavan, V., 951n
Raguini, J. R., 602
Rai, G. S., 456
Rajagopalan, R., 950d
Ramanandan, P. L., 870
Randhawa, G. S., 529
Ranjan, S., 34
Rao, M. S. S., 925
Rappaport, L., 453, 502, 503
Raski, D. J., 308
Ratvik, H., 420
Raucourt, M., 333
Rautavaara, T., 49
Raymond, W. D., 837
Rebello, D., 669v
Rebour, H., 839f
Reed, L. B., 576z
Reed, L. R., 354
Reeve, E., 535
Refatti, E., 347d
Regeimbal, L. O., 134, 135
Reghini, U., 241i
Reichardt, A., 202
Reid, R. D., 188
Reisaeter, O., 743o
Reitsema, R. H., 630
Reitz, H. J., 777
Renard, W., 49
Repp, G., 452
Reyes V., M., 879
Reynolds, F. J., 777
Ribosa Arno, P., 664
Rich, A. E., 254
Richards, S. J., 768
Richardson, B. H., 485
(Richter, H.), 976
Ridpath, M. G., 347e
Rieckehoff, I. G., 951o
Riehl, L. A., 795
Riera, A. R., 914
Rikovski, I., 517
del Río Ibáñez, J., 670h, 670i
Ríos, A., 951o
Rivera, C. T., 782
Rjabčun, O. P., 231
Roads Beautifying Association, 724
(Robert, —.), 414
Roberts, D., 118
Roberts, E. A. H., 946, 951p
Roberts, J., 345
Robertson, J. S., 894
Robertson, R. N., 17
Robinson, E. I., 386
Robinson, J. A., 691
Robinson, J. B. D., 365
Rocchetti, G., 951q
de la Rocha G., G., 237
Roche, R., 218
Rodney, D. R., 839g
Rodriguez, J. L., 795
Rodriguez-Ortiz, S. J., 152
Rohloff, I., 577a
Roldán, J., 914
Roll-Hansen, J., 408, 577b
Rollins, H. A., Jr., 123
Romanko, R. R., 281
Romano, E., 550
Ronzoni, G. L., 139
de Roo, H. C., 57
Rosa, M., 827
Rosberg, D. W., 318
Rosborough, T., 428
Rose, C. J., 345
Rosić, K., 454
Ross, E., 449
Rossetti, V., 289
Rota, P., 316
Rouillard, G., 951r
Roy, R. S., 951u
Royal Horticultural Society, 704, 707
Rubber Research Institute of Ceylon, 900
Rubin, V., 241j
Ruck, H. C., 98
Ruggieri, G., 778, 839h
Ruhland, W., 975
Ruiz Gijón, J., 670h, 670i
Rünger, W., 698, 714
Russell, R. C., 364
Russo, F., 752, 839i, 839j
Russo, G., 829
Ryall, A. L., 167, 181r
Rygaard, S., 49
Rygg, G. L., 815

Saanichton Dominion Experimental Farm, 997
Sadasivan, T. S., 67g
Saini, B. S., 573
(Sainsbury, G. F.), 170
Saitô, T., 440, 944
Salibe, A. A., 576h
Samorodova-Bianki, G. B., 18
Samson, J. A., 745
Samuels, E. W., 95
Sánchez P., A., 468
Sander, H., 521
San Juan, M. O., 639
Sankarasubramoney, H., 863
San Martín Casamada, R., 670j
Santaolalla Azpilicueta, G., 236, 302, 324
Santini, R., Jr., 951s
Santolaya, H., 950n
Saponaro, A., 802
Saraswathi-Devi, L., 67g
Sardo, S., 789
Sárosi, D., 246
Sastry, A. S., 614
Sastry, L. V. L., 618
Sastry, K. S. S., 951m
Satō, K., 140, 755
Savčenko, N. A., 418
Savellano, N. S., 889
Sawyer, R. L., 488
Sax, K., 96
Sayed, M. Q., 281
Scaramella Petri, P., 33
Scaramuzzi, F., 130
Scaramuzzi, G., 274, 347f
Scarascia, G. T., 596, 597
Scarascia-Venezian, M. E., 597, 598
Schaffalitzky de Muckadell, M., 27
Schaller, A., 577c
Schander, H., 253
Scheepers, G., 787
Schenk, H., 743p
Schindler, A. F., 684
Schlessinger, M. J., Jr., 458
Schmadlak, J., 113, 256, 347g
Schmitz, G., 880
Schneider, G. W., 131
Schneider, H., 776
Schubert, O. E., 46
Schultes, R. E., 899
Schulz, F., 184
Schuphan, W., 577d
Schwabe, W. W., 24
Schwartze, C. D., 242b, 242c
Scott, L. B., 611
Scott, L. E., 577e
Scott, R. A., Jr., 23
Sealy, J. R., 729
Seatz, L. F., 590
Sedov, E. N., 100
(Seeley, J. G.), 703
Semal, J., 577f
Sen, B. C., 951t
Serranillos, M. G., 670k
Servant, M., 665
Shaffer, J. D., 181s
Shah, S. M., 669v
Shantz, E. M., 978
Sharpe, R. H., 91, 238
Shaw, D. A., 541
Sheard, G. F., 67h
Shell Company of Venezuela, 998
Shepherd, K., 848
Shepherd, R. J., 446
Shewell-Cooper, W. E., 2
Shibutani, S., 577g
Shichijo, T., 774
Shifriss, O., 439
Shinkaji, N., 786
Shirck, F. H., 486
Shukla, K. C., 951u
Shukla, T. N., 617f
Shutak, V. G., 181t
Sibilia, C., 342
Sidor, C., 322
Siegel, A., 617t
Simard, J., 425, 426
Simmonds, N. W., 848, 951v
Sims, W. L., 511
Singh, H. B., 577h
Singh, I., 617f
Singh, S., 573
Sites, J. W., 839k
Skinner, J. C., 924
(Skiver, R.), 683
Skvorcova, N. T., 577i
Slavvo, A. V., 220
Smeets, L., 50, 106, 495
Smillie, R. M., 12, 13
Smith, C. B., 9
Smith, N. K., 345
Smith, P. F., 761
Smith, R. J., 798
Smith, R. L., 455
Smith, W. N., 366
Smith, W. W., 254
Smock, R. M., 122, 173
Snyder, E., 211, 212
Snyder, J. H., 150
Snyder, W. E., 727

van Soest, G. J. A., 154
Sohonie, K., 66y
Somers, E., 341
Somos, A., 53, 397, 421
Sondheimer, E., 242d
de Sonnaville, P., 117
Soost, R. K., 770
de Sornay, A., 951w
Sourdat, M., 839l
Spangelo, L. P. S., 78
Spencer, E. L., 546
Spencer, J. L., 884
Spetsig, L. O., 670l
Spice, H. R., 166
Spraying, L. V., 345
Sprecher, E., 625
Srinivasan, M., 618
Srivastava, D. P., 923
Stacey, E. C., 346f
Stadtherr, R., 390f
Stamper, E. R., 369, 374, 390i
Stangler, B. B., 672
Stankiewicz, Z., 523
Stanton, D. J., 554
Stapp, C., 976
Stark, F. C., 577e
Statens Forsøgsvirksomhed i Plantekultur, 249, 347h, 548, 577j
Staub, S., 909
Stearns, L. A., 347i
Steavenson, H., 673
Štefka, F., 201
Steninger, M., 670l
Stenseth, C., 483
Stepanova, A. M., 527
Sterling, C., 67i
(Stern, A. M.), 510
Stevenson, E. C., 518
Stevenson, E. E., 373
Steward, F. C., 978
Stewart, J. K., 506
Stewart, R. N., 684
Stinson, F. A., 579
Stoddard, E. M., 292
Stoll, A., 670m
Stoll, K., 176
Stolle, G., 137
Stott, K. G., 670n
Stoughton, R. H., 40
Stout, P. R., 547
Strachan, C. C., 160
Streef, G. M., 570
Streets, R. B., 715
von Strenge, H., 951x
Stritzke, S., 102
Strohman, R. E., 816
Struble, F. B., 446
Strydom, J. C., 743q
Su, N. R., 898
Subrahmanyan, V., 618
Subramanyam, H., 886
Sulochana, C. B., 67g
Summers, E. M., 844
Susini, E., 743r
Suszka, B., 734
Suszka, J., 255
Sutherland, M. D., 626
Šutić, D., 575
(Sveriges Yrkesfruktodlares Riksförbund.), 181u
Swanson, C. R., 67j
Swiatopolk-Mirski, A., 661, 669r, 669s, 669t, 669u
Swift, J. E., 338
Synge, R. L. M., 577k
(Szasz, J.), 510

Tabayoyong, F. T., 918, 919, 950z, 951a
Tabing, L. M., 487
Takahashi, T., 934, 935, 937
Takai, H., 663
Takayanagi, H., 939
Tamés, C., 45
Tanada, Y., 430
Tanganyika Sisal Growers' Association, 642
Tatchell, A. R., 646
Taylor, G. A., 8
Taylor, O. C., 794, 839m
Teakle, D. S., 409
Tea Research Institute of East Africa, 932
Terman, G. L., 590
Terts, I., 245
Teterev, F. K., 181v
Teubner, F. G., 524
Theron, C. J., 242e
Thévenin, L., 391, 513
Thiem, E., 325
Thill, H., 607
Thomas, P. K., 870
Thomas, P. T., 474
Thomas, R. G., 67k
Thomas, W. D. E., 339, 341
Thompson, A. E., 509
Thompson, B. D., 496
Thompson, F. C., 643, 648, 649, 654
Thompson, J T., 370
Thorne, G. N., 432
Thornton, N. C., 844
Thorpe, E. F. J., 837
Thresh, R., 978
Tietz, H., 346z
Tilgate Research Station, 362, 363
Timofeeva, I. V., 501
(Tobacco Research Board of Rhodesia and Nyasaland), 579
Tod, H., 740
Todd, F. A., 584, 585, 617u
Todd, G. W., 839n
Tolentino, L. J., 950c
Tolibas, P. C., 670o
Tolsma, S., 489
Tomašević, B., 319
Toole, E. H., 491
Toovey, F. W., 887
Torres, S. C. A., 803, 852
Torrey, J. G., 39
Toyama, Y., 663
Trabalzini, N., 224
Treccani, C. P., 172
Treggi, G., 567
Tritton, S. M., 977
Trkula, D., 617c
Trocmé, S., 736
Trojer, H., 871
Trueba, J., 209
Tsalpatouros, A., 855
Tsukamoto, Y., 701
Tucay, E., 950g
Tucker, B. D. A., 345
Tukey, H. B., 67l, 398
Tunisie, Service Botanique et Agronomique, 999
Turchi, A., 577l
Turner, D. J., 948
Turner, E. R., 577m

Umali, D. L., 635
Underwood, V. H., 242f
Urquijo Landaluze, P., 236, 302
U.S. Department of Agriculture, 951y
Usman, S., 951m
Uzzan, A., 831

von Vahl, E., 181w
Valenta, F., 230
Vega, M. R., 711
Veiga, F. M., 951z
Veiga, M. J., 302
Veihmeyer, F. J., 149
Velasco, J. R., 634, 864
Velázquez Diaz, J., 823
Veldstra, H., 978
Venkataramani, K. S., 952a
Ventura, E., 333
Verdura, R., 616
Vergani, A. R., 806
Verghese, E. J., 870
Verkerk, K., 525
Verona, O., 272
Vespignani, A., 330
Viado, G. B., 667, 782
Vickery, H. B., 599
(Vidal, J. L.), 300
Viel, G., 333
de Vilmorin, R. L., 393
Vincent, L. E., 814
Vinničenko, V. I., 198
Viso Rodríguez, A., 911
Visser, T., 88, 89
van der Vliet, M., 577n
Vogel, G., 48
Voigt, G. K., 980
van de Vrie, M., 313, 346p

Wade, E. K., 241r
Waggoner, P. E., 577o
Wain, R. L., 67m, 978
Wakisaka, I., 264
Wallace, A., 455, 459
Wallace, J. M., 839o
Wallace, T., 979
Wallihan, E. F., 763
Walter, J. M., 577p, 577q
Wang, H., 853
Wang, S.-C., 915, 916, 917, 920, 952b
Ward, J. B., 837
Ward, J. T., 1
Wareing, P. F., 37
Warren, J. C. R., 389
Washington Agricultural Experiment Stations, 1003j
Wasscher, J., 743s
Watanabe, R., 132
Watson, D. P., 721
Watson, G. A., 643, 670p
Waywell, C. G., 379
Webb, A. J., 433, 463
Weber, A., 548
Webster, B. N., 940, 941, 942, 952c
Webster, W. J., 223
Weca, 155

Wedding, R. T., 795, 809
Weeks, D., 150
Weinberger, J. H., 260
Weinmann, I., 577r
Weinstein, L. H., 32
Wellman, F. L., 844, 877
Wells, J. S., 741
Wene, G. P., 485
Wester, R. E., 462
Weston, E. W., 645, 651
Westrop, A. R., 371
Weybrfw, J. A., 615
Weydahl, E., 577b
Wheatley, S. M., 952d
Whittaker, E. C., 103
Whittle, R. M., 67n
Whitwell, J. D., 125
Wianko, M. R., 390j
Widmoyer, F., 718
Wiggell, D., 482
Wight, W., 952e
Wightman, F., 978
Wilde, S. A., 980
Wildman, S. G., 617t
Wiley, R. C., 417
Wilhelm, S., 294
Willard, C. J., 386
Willet, J. R., 846
Williams, A. H., 181x
Williams, C. F., 242f
Williams, C. G., 181y
Williamson, W. T. H., 490
Wills, P. A., 951l
Wilson, J. D., 407, 566
Wilson, R. W., 588
Winters, H. F., 885
Withrow, R. B., 21
Witte, K., 49, 406
Wittwer, S. H., 398, 502, 503, 524
Wolf, E., 213
Wolf, P. A., 347j
Wolfe, H. H., 390g
Woltz, W. G., 592
Wood, D. J., 946
Wood, J. C., 577k
Woodham, R. C., 248
Woodville, H. C., 708
Wulff, B. W. J., 181z, 345
Wye College, Department of Hop Research, 643
Wylie, W. D., 332
Yamada, S., 804
Yamasaki, K., 423
Yang, C.-C., 952b
Yates, R. A., 910
Yeddanapalli, L. M., 951k
Yeh, C.-S., 917
Ylagan, M. M., 500
Ynalvez, L. A., 500
Young, T. W., 883

Zabala, S., 766, 926
Zahn, F. P., 256
Zanardi, D., 533
Zanzibar Department of Agriculture, 842
Zattler, F., 652
Zaumeyer, W. J., 462
Žebrak, A. R., 28
deZeeuw, D. J., 467
Zink, F. W., 504
Zinna, G., 839p
Živickaja, L. I., 543
Zorin, F. M., 754
Zuccardi, R. B., 746

INDEX

H.A. Vol. 27, No. 2.

N.B.—Brackets round the name denote that this person, although not the author, was directly or indirectly concerned with the article.

Abdoh, Y., 1655a
Abraham, P., 1701a
Abrahão, J., 1786
Abramova, L. A., 1335
Ackerman, C. E., 1721
Acosta y Lara, G., 1695
Adams, D. F., 1730
Adamson, R. M., 1377, 1378
Adeni, M. K., 1594
Adsuar, J., 1782y, 1937
Aebi, H., 1306
(Aerts, —.), 1285
Agarwala, S. C., 1452
van Aggelen, J., 1084a, 1084r
Agricultural Improvement Council for England and Wales, 1979
Agulova, V. K., 1211
Ahmadi, A. A., 1482
Ahmed, M. B., 1245
Aichele, H., 1257
Aida, H., 1585a
Aki, S., 1043, 1511
Alban, E. K., 1408
Alberta Department of Agriculture, Canada, 1980
Aldrich, R. J., 1409
Ali, K. T., 1862a
(Allan, W.), 1985
Allen, G. R., 1012
Allison, R. V., 1701o
de Almeida Leme, H., 1959a
Almgren, K., 1183
Altman, J., 1710
Amateur Gardening Handbooks, 2008b
Amateur Gardening Picture Book, 2008c
Amling, H., 1146
Anderson, D. M. W., 1923
Anderson, E. J., 1916
Andrade, A. C., 1959b
Andrews, A. C., 1701b
Andrews, F. S., 1966
Andrews, W. B., 1084b
Angell, H. R., 1299
Anon., 1004, 1070, 1074, 1084c, 1084d, 1108, 1136, 1186, 1187a, 1228, 1235, 1251, 1382, 1387, 1396, 1403, 1555, 1585b, 1612, 1637, 1658, 1766, 1781, 1899, 1943, 1959c, 1959d, 1959e
Aramayo, H. S., 1187q
Ark, P. A., 1433, 1468
Arnold, E. H., 1393
Aronoff, S., 1627
Artamonov, N. V., 1219
Artem'ev, G. V., 1419
Asano, H., 1510
Ashby, E., 1028
Ashizawa, M., 1043
Askew, H. O., 1680
Astrego, J. J., 1782a
Attoe, O. J., 1615
Audia, W. V., 1084t
Australia, Commonwealth Dried Fruits Control Board, 2008e
Australian Canned Fruits Board, 2008d
Australian Wine Board, 2008f
Avidov, Z., 1581
Avocado Variety Committee, 1787
Avron, M., 1084e
Awada, M., 1854
Azzi, G., 1084f

Bachelder, S., 1710
Bachmanowa, S., 1441
Bachy, A., 1909
Baebler, S., 1648
Baggiolini, M., 1344
Bagley, J. M., 1084g
Baines, R. C., 1825
Baker, K. F., 1706, 1748
Bal, S. N., 1701c
Baldini, E., 1100, 1187b
Balevski, A., 1339
Ball, C. D., 1628
Bandurski, R. S., 1040
Banerjee, S. N., 1583
Banfi, A., 1804, 1862b, 1862c, 1862d
Banga, O., 1585c
Baptist, N. G., 1959f
Barbier, M., 1391
Barnes, D., 1505
Barnes, W. C., 1585d
Barreto Domínguez, R., 1959g
Barton, L. V., 1058
Baruah, H. K., 1954
Basan'ko, A. A., 1216
Basteleus, R., 1704
Basu, A. N., 1583
Bate-Smith, E. C., 1084h
Bates, W. N., 1962
Baudewijn, J., 1110, 1161
(Baumann, H.), 2006
Bavappa, K. V. A., 1953
van Bavel, C. H. M., 1607
Bean, G., 1075
Bean, R. C., 1796
Beck, W. R., 1790
Becker, G., 1585e
Becker, R. F., 1272
Beevers, H., 1031
Belalcazar G., J. A., 1746
Bell, —., 1257
Bellartz, S., 1714
Bellini, P., 1413a
Belohonov, I. V., 1256
Beñatena, H. N., 1804, 1862d
Benavides Gómez, M., 1401
Bendall, D. S., 1782b
Beran, F., 1362
Berger, P., 1655b
Bermuda Department of Agriculture, 2008g
Bernon, G., 1229, 1243
Berrill, F. W., 1871
Berzin, A., 1097
Besmer, A. F. H., 1435
Best, R. J., 1371a
Bestagno, G., 1717
Beutel, J. A., 1791
Bevan, W. J., 1459
Bhagchandani, P. M., 1541
Bieske, G. C., 1959h
Binaghi, G., 1656
Bingham, F. T., 1791
Birchfield, W., 1862m
Birk, L. A., 1373
Biron, R. A., 1655g
Bitancourt, A. A., 1892
Black, S., 1782d
Blaim, K., 1693
Blanpied, G. D., 1164
Bliss, C. I., 1371c
Bocanegra Salazar, S., 1473
Bocchi, A., 1055, 1674
Boek, K., 1265
Bogdańska, H., 1190
Bogdański, K., 1190
Böhm, O., 1585f
Bohn, G. W., 1585g, 1586j
Böhning, R. H., 1027
Bojarkin, A. N., 1084i
Bolay, A., 1306
Bollard, E. G., 1252
Bolle-Jones, E. W., 1866
Bolotskij, Ju. S., 1104
Bolton, A. T., 1371d
Bolzani, P., 1135
Bonnet, P., 1862f
van der Boon, J., 1088
Booth, C. O., 1963
Booth, E., 1700
Boots Pure Drug Company Ltd., 1319
Borden, A. D., 1360
(Borthwick, H. A.), 1495, 1759
Bosch, E., 1132, 1133
Bosher, J. E., 1311
Bosian, G., 1215
Bossard, R., 1782e
Botham, J. R., 1838
Boucher, M., 1959o

Bourgin, C., 1588
Bovay, E., 1248
Bovey, R., 1585h, 1655c
Bowers, A., 1701f
Bowman, F. T., 1086, 1187c
Boyce, A. M., 1862g
Boyle, W. W., 1769
Branas, J., 1243
van den Brande, J., 1726
Brannon, D. H., 1371e
Branzanti, E. C., 1187d, 1213
Breece, J. R., 1269
Brekke, J. E., 1203, 1348
Bremer, H., 1440
Brennan, E., 1566
Bressler, R. G., 1166
Breviglieri, N., 1212
Brian, P. W., 1046
Briski, B., 1585n
Britikov, E. A., 1084j
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Britton, D. M., 1189
Broadbent, L., 1964
Brock, A. M., 1346
Brockwell, J., 1744
Brown, E. G., 1701d
Brückbauer, H., 1274, 1371f
(van den Bruel, —.), 1351
Bruns, V. F., 1400
Brusca, J. N., 1814, 1815
de Bruyn, J. W., 1665, 1666
Buchloh, G., 1176
Buck, P. A., 1585i
Bucklew, L. L., 1959i
Buhler, D. R., 1177
Bujanov, M. F., 1120
Bukovac, M. J., 1047
Bukovac, P., 1655d
Bull, R. A., 1907, 1908
Bu'Lock, J. D., 1701e
Burckhardt, H., 1257
Burdick, E. M., 1084k
Burdine, H. W., 1458
Bürgi, A., 1187e
Burgis, D. S., 1434
Burnside, C. A., 1027
Burr, H. S., 1035
Burroughs, L. F., 1156
Butijn, J., 1088, 1143
Butterfield, N. W., 1029, 1782f
Büttner, G., 1056
Butzler, G. J., 1862h
Buxbaum, W., 1217
Byerrum, R. U., 1628

Cabolov, R. G., 1106
Cain, R. F., 1197
Čajlahjan, M. H., 1049
Calavan, E. C., 1862i
Calvert, A., 1550
Calvert, J., 1629, 1630
Cameron, H. R., 1371x
Cameron, J. W., 1799
Campbell, J. G., 2008b
Campbell, L., 1283
Campbell, R. E., 1582
del Campo, E., 1857, 1862j
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Capó, B. G., 1928
Cappelletti, C., 1030, 1084l
Caridad Igelmo, J. M., 1655e
Carlson, E. C., 1360, 1520
Carlson, R. F., 1386, 1774
Carnewal, J., 1919
Carpentier, L. J., 1010
Carra, P., 1782g
Carter, O. G., 1481
Carter, W., 1915
Cartledge, E. G., 1681
Cartwright, T. E., 1655f
Castaño A., J. J., 1895
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Chaffard, M., 1406
Chapas, L. C., 1907, 1908
Chappell, W. E., 1381
Chaput, A., 1651
Chardenon, J., 1771
Chaturvedi, M. D., 1782h
Chaudhary, S. A., 1437
Chen, C.-T., 1947
Cheney, P. W., 1268
Chessin, M., 1632
Chiarugi, A., 1084l, 1782i
Child, R., 1959k
Childs, J. F. L., 1862k
Ching, T.-M. T., 1040
Chopinet, R., 1750
Christie, J. R., 1371j
Christie, T., 1683
Chroboczek, E., 1470
Ciarimboli, U., 1240u
Ciccarone, A., 1275, 1835
Ciferri, R., 1639
Clark, D. S., 1160
Clore, W. J., 1400
Cocker, J. D., 1701f
Cockerham, K. L., 1959q
Coe, D. M., 1572
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Cohen, M., 1014, 1832
Collins, W. E., 1579
Collyer, J. E., 1446
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Conover, R. A., 1572
Constable, D. H., 1959l
Converse, R. H., 1302
Cooil, B. J., 1854
Cooke, C. H., 1782j
Cooke, G. W., 1516
Cooper, C. M., 1862l
Cope, F. W., 1013
Córdoba, O. G., 1169
Coronado P., R., 1327
Corrà, F., 1184
Cortès, V., 1649
Corti, R., 1701g
Cosmo, I., 1240a, 1347
Cota Galan, R., 1626
Coveney, R. D., 1661
Cowgill, W. H., 1959m
Cowley, R. W. I., 1087
(Cox, J. A.), 1240b
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Crane, J. C., 1119
Crescini, F., 1413a
Criddle, W. D., 1084g
Crispín M., A., 1490
Crittenden, H. W., 1436
Crocomo, O. J., 1585j
Crofts, F. C., 1481
Crossa-Raynaud, P., 1127
Cuillé, J., 1849, 1872
Cutright, C. R., 1315
Cuzin, J., 1591
Cvetaeva, E. M., 1451
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Dahl, M. H., 1488
Daines, R. H., 1566
Dalbro, K., 1192
Dalmasso, G., 1328
D'Amato, F., 1444, 1474
Davenport, J. B., 1157
Davidson, J., 1775
Davidson, R. H., 1973
Davis, D., 1569
Davis, E. L., 1677
Davis, S. H., Jr., 1782k
Davis, T. A., 1959n
Davison, R. M., 1134
Day, B. E., 1383
Day, P. R., 1543
Deep, I. W., 1279, 1280
Degan, A., 1084m
Deighton, F. C., 1868
Dejmontovič, B. I., 1592
Del Gaudio, S., 1240d
Delhaye, R. J., 1688
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Dent, H. C., 1965
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De Rosa, M., 1331
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D'Herde, J. D., 1726
Di Caro, S., 1374
Dickinson, D., 1158
Dieterich, H., 1782l
Dijksterhuis, H. P., 1180
Dimond, A. E., 1569
Ditman, L. P., 1439
Divekar, M. V., 1927
Djulizibarić, T., 1340
Dodel, J. B., 1405
Dodson, A., 1514
Doerpinghaus, S. L., 1051
van Doesburg, H. H., 1103
Doesburg, J. J., 1240c
Doorenbos, J., 1978
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Dorasami, L. S., 1959p
(Downs, R. J.), 1759
Drake, R. J., 1794
D.S.I.R., New Zealand, 1084n
DuCharme, E. P., 1862m
Dufrenoy, J., 1601, 1619
Dugas, A. L., 1959q
Dullum, N., 1192
Dunegan, J. C., 1371g
Dunham, R. S., 1413b

Duperrex, A., 1549
Dupoux, A., 1206
Dupuis, H., 1220
Durbin, R. D., 1741, 1748, 1749
During, C., 1743
Dutton, W. C., 1413c
Dye, M. H., 1354, 1371h

Eady, C. A., 1869
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Edmond, J. B., 1966
Edwards, G., 1819
Eichholz, W., 1701h
van Eimern, J., 1257
Einset, J., 1095
Elliot, J. M., 1608
Elliott, I. L., 1427
Ellis, D. E., 1466
Elzenga, G., 1665, 1666
Emparan, P. R., 1690
van den Ende, J., 1424
Endemann, W., 1597
Enderud, J., 1091
Enochian, R. V., 1531
Epps, W. M., 1585d
Erspamer, J. L., 1795
d'Ersu, A. P., 1231, 1845
Erwin, W. R., 1360
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Evans, H. J., 1022
Evans, L. T., 1026
Evreinoff, V. A., 1101, 1102
Evstaf'eva, V. A., 1946

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Fairbanks, A. J., Jr., 1634
Fardy, A., 1591, 1620
Farmer, A., 1134
Fedołova, T. K., 1168
Fedorov, A. A., 1801
Fernando, H. E., 1914
Fernqvist, I., 1195
Ferrand, M., 1909
Ferreyra H., R., 1701i
Fidler, J. C., 1167, 1179
Finch, C. G., 1447, 1525
Finkenbrink, W., 1364
Finney, D. J., 1013
Fireman, M., 1862o
Fischer, C. C., 1702
Fisher, E. G., 1281
Fitzpatrick, R. E., 1371d
Flanders, S. E., 1959r
Fleischhauer, O., 1752
Flerov, A. F., 1211
Fletcher, F. W., 1655g
Flock, R. A., 1271
Floor, J., 1103
Flores, M. A., 1896, 1897
Fluke, C. L., 1727
Foley, R. F., 1500
Fors, A. L., 1936, 1942
Forshaw, J. E., 1187g
Forsyth, W. G. C., 1881, 1882
Foster, J. C., 1033
Foulds, R. M., 1293
Foury, C., 1782m
Foury, R., 1782m
Fracanzani, G. A., 1633
Françot, P., 1309
Frankenburg, W. G., 1652, 1653, 1654
Franssen, C. J. H., 1492
Frear, D. E. H., 1349, 1350
Freeman, J. F., 1411
Freeman, T. E., 1503
Freixas, A. A., 1860
French, B. C., 1166
Fritzsche, R., 1132, 1133, 1316
Frohberger, P. E., 1487
Frohlich, E. F., 1862s
Frost, H. B., 1799
Fujioka, S., 1734
Fujita, K., 1784, 1822, 1843, 1844
Fulling, E. H., 1701j
Fulton, R. H., 1202
Fulton, R. W., 1262

G—., G., 1310
Gagnard, J., 1808
Galbally, J. H. W., 2008b
Galbis, J. A., 1610, 1611
Galet, P., 1967
(Gallay, R.), 1994
Gallego y Gómez, F., 1672
Gammon, N., Jr., 1234
Garavel, L., 1237
Garayar, H. N., 1807, 1945, 1959s
Gard, L. N., 1376
Gardner, M. E., 1226
Gargiulo, A., 1207
(Gartenbau-Nomenklatur-Ausschuss), 1005
Gasser, R., 1246
Gaston, H. P., 1187i
Gatty, R., 1657
Gawler, J. H., 1158
Gazzari, A., 1205
Geard, I. D., 1304
Georghiou, G. P., 1337, 1858
Geraldson, C. M., 1423, 1457
Gerola, F. M., 1782n
Gerritsen, C. J., 1862n
Gianfagna, A. J., 1782d
Gifford, E. M., Jr., 1276, 1277
Gillespie, H. L., 1789
Gilligan, G. M., 1146
Gilpatrick, J. D., 1314
Gilpin, G. L., 1438
Giorgi, E., 1240e
Giusto, D., 1240d
Gjaerum, H. B., 1371i
Glasser, R. F., 1585k
Glater, R. A. B., 1780
Glavinič, R., 1593
Glock, E., 1623
Gokhale, G. P., 1959t
Golubinskij, I. N., 1713
Gomes da Silva, J., 1959u
González B., J. E., 1491
González C., H., 1859
Good, J. M., 1371j
Goodall, G. E., 1809
Goodman, O., 1542
Goossen, H., 1371k
Gorlenko, M. V., 1486
Gottscho, A. M., 1653
Gouère, —., 1142
Govindarajan, S. V., 1959v, 1959w
Graham, T. W., 1595
Grant, T. J., 1831
Grasby, C. G., 1148
Grassi, U., 1090
Greenfield, I., 1782o
Greenwood, C. T., 1923
Greenwood, M. L., 1371c
(Greeves, T. N.), 2008o
Gregory, P. J., 1959x
Grierson, W., 1846
(Grim, J. H.), 1139
Grob, K., 1648
Grochowska, M., 1255
Grogan, R. G., 1528, 1529
Groh, W., 1096
Grolleau, J., 1232
Grooters, G. T., 1084o
Groszmann, H. M., 1960u
Guengerich, H. W., 1263
Gunther, F. A., 1847
Gupta, B., 1701c
Guseva, T. I., 1335
Guterres Soares, R. N., 1959y
Guthrie, F. E., 1641, 1642
v. Guttenberg, H., 1038
Guyer, G., 1506
Guyot, H., 1872
Guzmán M., E., 1489
Guzman, V. L., 1392
Gwirtsman, J., 1084u

Haarer, A. E., 1968
Haas, A. R. C., 1814, 1815
Haasis, F. A., 1735
Haccius, B., 1042
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Hafen, L., 1585l
Hafiz, A., 1242
Hagedorn, D. J., 1655r
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Hale, C. R., 1208
Hall, A. P., 1797
Hall, D. W., 1959z
Halsall, T. G., 1701f
Hamilton, J. K., 1701k
Hamilton, R. H., 1040
Hammer, O. H., 1366
Hammond, L. C., 1073
Hanger, F., 1776
Hansen, E., 1177
Hansen, R. M., 1371l
Hanson, W. D., 1585v
Harada, S., 1949, 1960a
Haramoto, F. H., 1769
Harborne, J. B., 1021
Hårdh, J. E., 1196, 1290, 1303
Harding, R. B., 1818, 1862o
Hare, W. W., 1574
Harler, C. R., 1960b
Harris, D. G., 1607
Harris, J. O., 1685
Harris, W. B., 1138
Harrison, D. E., 1570
Harrison, I. R., 1740
Hart, W. H., 1862p
Harvey, J. M., 1230
Haskell, G., 1092, 1546
Hasselstrom, T., 1659
Hatch, A. B., 1371m
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Hawley, W. O., 1667
Hay, J. R., 1402
Hazleton, L. W., 1655h
Head, W. F., Jr., 1911

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Heggeness, H. G., 1085h
Heikinheimo, O., 1317
Heinonen, S., 1484
Hejndorf, F., 1488
Hellqvist, H., 1375
Hemming, H. G., 1046
Hemphill, D. D., 1379
Henauer, A., 1334
von Hentig, W.-U., 1739
Heremans, R., 1673
Hernández, M. R., 1896
Herrmann, R., 1625
Heslop-Harrison, J., 1039, 1675
Hewitt, E. J., 1452
Hewitt, W. B., 1226, 1276
Higdon, R. J., 1139, 1150
Highkin, H. R., 1476
Hiki, M., 1465
Hill, A. V., 1638
Hill, R., 1782b
Hillsborough Agricultural Research Institute, Northern Ireland, 2008a
Hinreiner, E., 1360
Hinton, H. E., 1352
Hirt, W., 1259
Hitchborn, J. H., 1585m
Hitier, H., 1636
Hitz, C. W., 1146
Hoare, E. R., 1068
Hockey, K. C., 1079, 1461
Hodgson, R. W., 1862q
Hoglund, C. R., 1067
Hollunder, W., 1767
Holmes, F. O., 1719
Holmes, R. M., 1565
Hoos, S., 1862r
Hopkins, L., 1585z
Horgas, D., 1585n
Hornby, C. A., 1099
Horner, C. E., 1660
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Houssny, H. H., 1575
Houston, B. J., 1564
Howard, G. A., 17011
Howe, E. E., 1669
Howes, M. M., 1050
Howland, A. F., 1582
Hoyt, S. C., 1318
Huber, H., 1705
Hubert, F. P., 1960c
Hudson, J. P., 1034
Hudson, J. R., 1682
Huet, R., 1874
Huffaker, C. B., 1323
Hughes, C. G., 1960d
Hughes, H. M., 2008b
Hull, J. W., 1189
Hulme, A. C., 1155
Hunnam, D., 1293
Hupkens van der Elst, F. C. C., 1427
Huter, R., 1589
Hutson, R., 1506
Huxley, A. J., 2008c
Huzii, T., 1585q

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Ildis, P., 1231, 1842, 1845
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Istas, J. R., 1673
Itagi, T., 1465
Itinskij, V. I., 1062
Ito, H., 1462
Ito, K., 1499, 1915
Ivanovskaja, A. A., 1802
Iyengar, K. G., 1692
Izard, C., 1636

Jacks, H., 1571, 1722
Jacobson, M., 1687
Jagendorf, A. T., 1084e
Jain, S. S., 1901
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Jamalainen, E. A., 1171
Jamison, F. S., 1429
Jang, R., 1016, 1017
Jannone, G., 1656
Jasmin, J. J., 1397
Jeener, R., 1655i
Jefferson, R. N., 1732, 1747
Jeffrey, R. N., 1617
Jegorowa, S. A., 1353
Jenkins, H. V., 1481
Jenkins, J. E. E., 1543
Jenkins, J. M., Jr., 1735
Jensen, H. J., 1660
Jensen, W. A., 1084p
Johansson, E., 1122
Johar, D. S., 1960j
Johnson, B., 1578
Johnson, W. T., 1332
Johnston, J. C., 1862s
Johnston, S., 1193
Jones, F. G. W., 1585o
Jones, H. A., 1535
Jones, J. P., 1567
Jones, J. R. D., 1585p
Jones, L. T., 1208
Jones, P. A., 1890
Jones, W. W., 1816
Jordović, M., 1371n
Jørgensen, J., 1523
Junaid, A. H. M., 1712
Jung, J., 1707

Kaesberg, P., 1655r
Kagawa, A., 1537
Kajimoto, S., 1805
Kalantyr', M. S., 1689
Kallio, T. K., 1187h
Kamata, H., 1152
(Kamp, J. R.), 1757
Kausche, G. A., 1274
Kavaljian, L. G., 1084p
Kawaguchi, T., 1737
Kawai, S., 1948
Kawamura, S., 1493, 1585q
Kebby, R. G., 1869
Keijer, E. J., 1180
Kelbert, D. G. A., 1423
Kelly, W. H., 1061
Kennett, C. E., 1323
Kenten, R. H., 1485
Kenworthy, A. L., 1150
Kessler, B., 1084q
Keuls, M., 1443
Kidder, E. H., 1067
Kincl, F. A., 1957
Kindt, V., 1585r
King, N. C., 1938
Kips, R. H., 1726
Kira, H., 1151
Kitchin, J. T., 1552
van Kleffens, E. J., 1084a, 1084r
Klein, L. G., 1095
Klenk, E., 1223
Klingler, J., 1330
Klotz, L. J., 1862t, 1862u
Knickmann, E., 1224
Knight, R., 1878
Knoppien, P., 1247
Knorr, L. C., 1830, 1833
(Kobel, F.), 2002
Koch, F., 1782p
Koch, L. W., 1655j
Kolesnik, A. A., 1175
Kolomiec, I. A., 1114
Komarova, E. S., 1240g
Konlechner, H., 1240h, 1240i, 1240j
Koo, R. C. J., 1820
Kooiman, P., 1053
Korol'kov, E. D., 1083
Koržina, A. N., 1598
Kosugi, K., 1729
Koto, M., 1152, 1811, 1843, 1844
Kovachich, W. G., 1910
Kowalewsky, B. W., 1563
Král, J., 1286
Kramer, M., 1568
Krammer, A., 1439
Krasil'nikov, N. A., 1308
Kristensen, H. R., 1467
Kříž, J., 1679
Kronenberg, H. G., 1240c
Krylov, A. V., 1175
Kryžanovskij, F. D., 1556
Kublickaja, M. A., 1308
Kumaki, Y., 1509
Kunz, G., 1322
Kurzmann, P., 1425
Kutschajewa, A. G., 1353
Kuwabara, Y., 1960f
Kuwada, H., 1497, 1498
Kuzin, A. M., 1019
Kuz'min, A. Ja., 1240k
Kuznecova, A. K., 1720

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Lange, W. H., 1360
Langerak, D. I., 1182
Lantz, H. L., 1782q
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LeBlanc, R. J., 1960i
Leblond, C., 1181
Lecoufle, M., 1970
Lee, B. W., 1862w
Lee, O. C., 1394
Lefort, E. J. E., 1388
Lehmann, P., 1257
Leiser, A. T., 1777
Lemaistre, J., 1413d
Lenartowicz, W., 1147
Leonard, C. D., 1819
Leone, I. A., 1566
Łęski, R., 1329
Le Tourneau, D., 1085h
Levin, J. H., 1187i
Levonen, H. J., 1410
Lewis, D. A., 1502
Lewis, Y. S., 1960j
van der Linde van Sprankhuizen, J. C., 1389
van der Linde, W. J., 1313
Ling, P., 1864
Ling, R.-S., 1864
Lingle, J. C., 1415
Linsley, E. G., 1360
Liyanage, D. V., 1883
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Locsin, C. L., 1929
Loewus, F. A., 1016, 1017
Lohmeyer, V. K., 1342
Lona, F., 1024, 1048, 1674
Loomis, W. E., 1372
Lordello, L. G. E., 1504
Lorenzen, C., 1584
Louis, A., 1187j
Lowe, A. D., 1454, 1455, 1585t
Luce, E. N., 1862h
Luckwill, L. C., 1159
Lukoschus, F., 1413e
Lumnitzer, G., 1655t
Lund, H. A., 1655k
Lundstad, A., 1751, 1753
Lunt, O. R., 1742
Lutrick, M. C., 1561
Lužeckij, S. N., 1225
Lynch, L. J., 1494
(Lyssiotis, P.), 2008i

Maatsch, R., 1728, 1739
McAleer, W. J., 1669
McCarty, C. D., 1383
Maccario, G., 1782r
McClellan, W. D., 1731, 1733
MacCollom, G. B., 1469
McFarlane, G. C., 1873
McGlasson, W. B., 1178
Mackay, J. H. E., 1744
McKeen, C. D., 1547
McLean, D. M., 1535
MacNab, J., 1058
McNaught, K. J., 1564
McNew, G. L., 1518
McNulty, I. B., 1241
MacPhee, A. W., 1361
McQuown, F. R., 1782s
Madison, J. H., Jr., 1624
Madsen, H. F., 1318, 1360
Maeda, T., 1510
Mahlstede, J. P., 1384
Majstorović, G., 1187k
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Malcolm, J. L., 1558
Mallach, N., 1371o
Mallo, R. G., 1862x
Mameli-Calvino, E., 1782t
Mancuso, B., 1117
Mandryk, M., 1638
Manganelli Ranieri, A., 1699
Mann, L. K., 1502
Mann, P. J. G., 1485
Manzoni, L., 1240m
Marcelli, E., 1655l
Marcussen, K. H., 1782u
Marlatt, R. B., 1585z
Marsilii, H., 1413f
Marth, P. C., 1084t
Martin, E. C., 1356
Martin, J. P., 1825
Martinelli, E., 1413a
Martínez Andreu, A., 1338
Martinozzi, N. C., 1240n
Martins da Silva, D., 1960k
Mary, N. Y., 1701m
Marzec, T., 1253
Mason, H. C., 1580
Mastalerz, J. W., 1715
Matsumoto, T., 1493
Matthews, L. J., 1413g
Matthews, W. S. A., 1661, 1671
Matusiewicz, E., 1603, 1604
Mavrodineanu, R., 1084u
May, E. B., 1905, 1906
Mazery, G., 1960l
Mazurova, T. A., 1475
Megli, V., 1116
Mellor, F. C., 1371d
Mendes, J. E. T., 1960m
Mendes da Ponte, A., 1960n
Mengel, K., 1085b
Menges, R. M., 1409
Merchant, C. H., 1585u
Merker, J., 1613
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Michel, H., 1756
Michieli, G., 1345
Middelburg, H. A., 1605
Milbrath, J. A., 1266, 1267
Miles, M., 1585w
Miller, E. J., 1370
Miller, G. W., 1022
Miller, L. W., 1369
Miller, M. P., 1862o
Miller, P. A., 1742
Miller, P. M., 1282, 1287, 1305, 1723
Miller, P. W., 1198, 1273
Miller, R. L., 1817
Miller, V. J., 1782v
Millikan, D. F., 1263
Mills, W. D., 1281
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Mirimanjan, V. A., 1821
Miskus, R. P., 1360
Mitchell, J. W., 1084t
Mitchell, R. S., 1494
(Modlibowska, I.), 1258
Moje, W., 1825
Molin, G., 1808
Monk, R., 1616, 1618
Montagnani, P., 1778, 1779
Montealegre, M., 1960o
Monzini, A., 1184
Moore, B. P., 1701n
Moore, E. L., 1655m
Moore, J. G., 1797
Moore, P. W., 1810, 1862y
Mora Urpí, J., 1960p
Morais, F. R. P., 1960q
Moreau, C., 1848
Morettini, A., 1098
Morgan, A. F., 1797
Morgan, O. D., 1640
Moriarty, F., 1585o
Morita, Y., 1144, 1145
Morton, H. G., 1701o
Moscoso, C. G., 1958
Moss, R. I., 1887
Mottier, P.-P., 1585x
Mrożewski, S., 1448
van den Muijzenberg, E. W. B., 1368
Mukasa, S., 1843, 1844
Mukula, J., 1410
Mulder, D. P. J., 1724
Mulder, E. G., 1063
Müller, G., 1246
Müller, R., 1625
Mulligan, B. O., 1754
Mune, T. L., 1413h
Murneek, A. E., 1015
Murtaza Sharif, M., 1242
Murthy, A. S., 1594
Musser, A. M., 1966
Muthuswamy, S., 1218, 1240q
Mutō, T., 1149
Muzik, T. J., 1917
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Mynhardt, C. B., 1824
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Naito, N., 1295, 1355
Nakamura, E., 1536
Nakata, S., 1854
Nambiar, K. K., 1955, 1960r
Nankivell, W. I., 1187l
Nasir, M. M., 1712
Natarajan, A. T., 1694
Nathanael, W. R. N., 1884

National Research Council of Canada, 2008h
Nauer, E., 1862y
Naylor, A. G., 1960s
Nebraska Agricultural Experiment Station, 20081
Neilson, J. J., 1395
Neiswander, R. B., 1760
Nelder, J. A., 1084w
Nelson, P. K., 1754
Nemeth, L., 1655o
Neofitova, V. K., 1573
Nesterov, Ja. S., 1123
Neururer, J., 1362
Newman, D. W., 1241
Newton, W., 1311
New York State Agricultural Experiment Station, 2008m
New Zealand Department of Scientific and Industrial Research (D.S.I.R.), 1084n
Niavis, C. A., 1018
Nichols, C. W., 1291
Niederhauser, J. S., 1490
Nield, J., 1960t
Nies, H., 1042
Nilsson, F., 1174
Nishita, H., 1563
Nitsch, J. P., 1758
Nizi, G., 1643
Njoku, E., 1782x
Noda, A., 1606
Nordmeyer, H., 1078
Norman, P. A., 1831
Noro, K., 1805, 1856
Norris, D. O., 1084x
Norris, R. E., 1862v
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Norton, R. A., 1200
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N.S.W. Department of Agriculture, Biological Branch, 1288, 1289, 1371b, 1782c, 1862e
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Nyrkov, N. V., 1219
Nystrom, C. W., 1084y

Občinnikova, L. M., 1522
Ochs, R., 1904
O'Connor, B. A., 1413h
Odincova, M. S., 1009
Ōgaki, C., 1149
Ogden, W. B., 1615
Oka, H., 1655n
Oknina, E. Z., 1240k
Oliver, J., 1610, 1611
Ollero, A., 1649, 1650
Olmo, H. P., 1240o
Olsen, O. A., 1395
Olson, E. O., 1828
Olson, R. L., 1783g
Ono, H., 1548
Oostenbrink, M., 1435
Oppenheimer, C., 1865
Orel, L. I., 1553
Orellana, R. G., 1877
Orlando, A., 1786
O'Rourke, F. L. S., 1076
O'Rourke, J. T., 1960u
Osakabe, M., 1950
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Oste, C. A., 1187q
Oster-Volkov, N. N., 1062
Oteifa, B. A., 1575
Overman, A. J., 1434
Ozawa, H., 1066

Paci, P., 1512
Pack, A. B., 1646
Pal, B. P., 1585y
Palm, E. T., 1518
Palmer, T. P., 1546
Paneque, A., 1650
Panero, M. S., 1862z
Panini, F., 1701p
Pardy, A. A., 1755
Parham, J. W., 1413h
París, R., 1663, 1664
Parker, K. G., 1281
Parks, A. B., 1438
Parmeijer, W. L., 1077
(Parmentier, G.), 1534
Parra H., J., 1960v
Parsons, W., 1356
Partsch, G., 1453
Pastore, R., 1240p
Pastoriza, R., 1169
Patrick, R., 1846
Patron, A., 1153, 1850, 1863a
Paul, V., 1602
Pavillard, J., 1631
Peairs, L. M., 1973
Pearse, H. L., 1600
Peck, N. H., 1431
Peeters, F., 1764
Pel'tihin, S. V., 1430
Penningsfeld, F., 1425
Pennsylvania Agricultural Experiment Station, 2008n
Pérez, J. E., 1782y
(Pérez, R.), 1412
Perlusz, T., 1655o
Perraudin, G., 1172, 1442
Perret, J., 1321
Persing, C. O., 1644
Peterson, P. A., 1792
Petrenko, A. G., 1598
Pew, W. D., 1585z
Peyer, E., 1222, 1367
Pflug, I. J., 1173
Philipp, F., 1586a
Philipp, W., 1320, 1621
Phillips, J. S., 1885
Picard, —., 1385
Pickering, G. B., 1661, 1671
Pienaar, W. J., 1084z
Pieniążek, S. A., 1131, 1255
Pierpoint, W. S., 1586b
de Pietri-Tonelli, P., 1772
Pilet, P.-E., 1756
Pilot, R., 1960w
Pimentel Gomes, F., 1902
Pinheiro, E. D., 1892
Plehanov, Ju. S., 1112
Podešva, J., 1421, 1426
Pohjola, K., 1054
Poidevin, J., 1586c
Pokorný, M., 1679
Polsinelli, M., 1240a
Poma Treccani, C., 1170
Pomini, L., 1662
Pontovič, V. E̊., 1691
Popenoe, H., 1073
Posnette, A. F., 1264
Pospíšilová, J., 1526
Possingham, J. V., 1560
Post, J. J., 1443
Pound, G. S., 1585s
Pratt, P. F., 1816, 1818
Price, W. C., 1833
Pridham, T. G., 1371r, 1432
Priestley, G., 1508
Priestley, W. G., 1449
Procenko, A. E., 1720
Prokof'ev, A. A., 1701q
Pryor, R. L., 1731
Puccini, G., 1716
(Purseglove, J. W.), 2008p
Pyriki, C., 1625

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Quesnel, V. C., 1882

R., G., 1932
Rabb, R. L., 1641
Raekelboom, E. L., 1673
Raghavan, V., 1954
Rakitin, Ju. V., 1175
Ramadan, D., 1697
Ramakrishnan, C. V., 1823
Raman, K. R., 1471
Ramanathan, R., 1240q
Ramaswami, K., 1960x
Ramp, R. M., 1960y
Randolph, J. W., 1460
Rao, A. S., 1668
Rao, S. N., 1119
Rao, U. N., 1218, 1240q
Rao, Y. R. S., 1960z
Rappaport, L., 1045
Rasmussen, A. O., 1782d
Ratner, E. I., 1557
Rautavaara, T., 1187m
de Ravel, G., 1586d
Rebosio, A., 1407
Rebour, H., 1072, 1187n
Rębowska, Z., 1416
Reddie, K. K., 1655p
Reeks, W. A., 1773
Reeves, E. L., 1268
Refatti, E., 1244
Rehm, S., 1913
Reichert, I., 1827
Reimann-Philipp, R., 1738
Reinhold, J., 1418
Reitz, H. J., 1812
Rejman, A., 1255
Reuther, W., 1863b
Reynolds, H., 1438
Reynolds, J. L., 1376
Ribereau-Gayon, J., 1227
Rich, A. E., 1272
Richards, M., 1079
Richards, R. R., 1129
Richardson, A. M., 1240r
Richardson, H. H., 1903
Richardson, R. W., Jr., 1489
Riehl, G., 1718
Rijven, A. H. G. C., 1037, 1052
Ritchie, A. E., 1655f
Ritter, C. M., 1163
Rjabova, A. N., 1126

(Roberts, A. N.), 1201
Roberts, D., 1125
Roberts, E. T., 1517
Robertson, J. S. M., 1923
Robin, F., 1399
de la Rocha G., G., 1109, 1855
Rodríguez G., A., 1893
Roelofsen, B., 1194
Roever, W. E., 1240s
Rollin, L., 1647
Roney, E., 1293
Rose, G. J., 1068, 1961a
Rose, H., 1970
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Rosi, O., 1772
Ross, A. A., 1803
Roth, H., 1903
Rounds, M. B., 1787, 1863c
Rovskij, V. M., 1238
Rowe, G. A., 1162
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Rubber Research Institute of Malaya, 1390, 1920, 1921, 1922, 1961b, 1961c
Rubio, M., 1655q
Rumora, L., 1205
Rüppold, H., 1363

Saccas, A. M., 1898
Sagawa, Y., 1736
Saitô, T., 1462
Sala, O., 1782y
Salibe, A. A., 1585j
Salminen, M., 1085a
Salokangas, K., 1507
Salvaterra, G., 1343
Samish, R. M., 1130
Sammet, L. L., 1166
Samorodova-Bianki, G. B., 1553
Šamsiev, K. Š., 1238
Samuels, C. E., 1348
Samuels, G., 1928
Sanford, K. H., 1361
Santocchia, A., 1717
Sastry, K. S. K., 1692
Sastry, K. S. S., 1940
Sato, C. S., 1628
Satô, R., 1951
Satyanaranaswamy, G., 1952
Sauer, M. R., 1312
Saunders, G. W., 1577
Sauvage, G., 1586e
Savary, A., 1344
Sayre, C. B., 1515
Sazikin, U. V., 1128
Scaramella Petri, P., 1214
Scaramuzzi, F., 1113, 1187b, 1187o
Scaramuzzi, G., 1261, 1278
Scaranari, H. J., 1961d, 1961e
Sch., E., 1080
Schad, C., 1206
Schander, H., 1124
Schanderl, H., 1210
Scharrer, K., 1085b
Schein, R. D., 1250
Schenk, H., 1782z
Schmidt de Gil, J., 1860
Schmidt, H., 1059
Schmidt, T., 1585f
Schneider, F., 1326
Schneider, G. W., 1187p
Schread, J. C., 1711, 1761, 1768
Schroeder, C. A., 1798, 1961f
Schuldt, P. H., 1357
Schuphan, W., 1154
Schuster, M. L., 1696
Schutt, K., 1745
Schwartz, D., 1591, 1599
Sciaroni, R. H., 1706
Šebánek, J., 1422
Secrett, F. A., 1524
Seegmiller, C. G., 1016
Seinhorst, J. W., 1312
Self, R. L., 1121
Selhime, A. G., 1836
Selman, I. W., 1033
Sequeiros, J. M., 1610, 1611
Serini, G., 1185
Service d'Exploitation industrielle des Tabacs et des Allumettes, Paris (S.E.I.T.A.), 1587
Sexsmith, J. J., 1404
Shanks, J. B., 1709
Sharpe, R. H., 1234
Shaw, C. G., 1730
Shedley, D. G., 1333
Shigeta, T., 1861
Shimokawa, M., 1548
Shimokoriyama, M., 1783a
Shing, K.-C., 1912
Shull, A. V., 1828
Sibilia, C., 1371s
Sidwell, A. P., 1197
Sierra Leone Department of Agriculture, 2008o
Sifuentes, J. A., 1505
Sikka, S. M., 1585y
de Silva, C. A., 1918
Silva Fernandes, C., 1060
Simão, S., 1902
Simmonds, N. W., 1961g
Simmons, T. H., 1417
Simone, M., 1360
Singapore Botanic Gardens Department, 2008p
Singh, H. B., 1541, 1585y
Singh, L. B., 1975
Singh, P., 1770, 1783b, 1863d
Singh, R. N., 1975
Sinha, S. K., 1041
Sironval, C., 1023
Sisakjan, N. M., 1009
Sites, J. W., 1820
Skalská, E., 1137
Skiebe, K., 1783c
Skinner, C. G., 1527
Skinner, H., 1775
Skiver, R. E., 1783d
Slesareva, E. I., 1141
Slootweg, A. F. G., 1725
Šmatok, I. D., 1025
Smeets, L., 1118, 1666
Smirnoff, W., 1837
Smith, C. B., 1483
Smith, C. C., 1773
Smith, F., 1701k
Smith, F. G., 1085c
Smith, F. J., 1531
Smith, H. C., 1301
Smith, K. M., 1976
Smith, L. C., 1342
Smith, W. A., 1577
Smith, W. P. C., 1863e
Smoyer, K. M., 1863f
Šnejder, Ju. I., 1486
Snethlage, P., 1961h
Šobek, J., 1236
Soboleva, I. M., 1430
Soczek, Z., 1131
(Soenen, —.), 1285
Sokoloff, B., 1863g
Soldatenkov, S. V., 1475
Soldatov, P. K., 1240t
Sommer, N. F., 1165
(Sommereyns, —.), 1260
Soost, R. K., 1799
Sorensen, L. O., 1480
Sorge, P., 1191
(Soteriades, C.), 1986
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Spangler, R. L., 1586f
Spence, M. T., 1036
Spencer, H., 1836
Spencer, M. S., 1554
Speroni, H. A., 1800
Spickett, R. G. W., 1686
Spoon, W., 1670
Spriestersbach, D. R., 1701k
Spruit, D., 1670
Spurling, M. B., 1087
Squibbs, F. L., 1450, 1472
Srivastava, J. G., 1863d
Staehelin, M., 1248, 1306
Staff, C. E., 1071
Stahmann, M. A., 1655r
Stańczak-Boratyńska, W., 1008
Stark, F. C., 1464
State College of Washington, 2003
Stautemas, E., 1765
Stearn, W. T., 1783e
Stefanelli, G., 1069
Steffens, G. L., 1609
Steinberg, R. A., 1617
Steindl, D. R. L., 1935
Steiner, A., 1130
Stephenson, M. L., 1622
Stevens, D. M., 1586g
Stewart, I., 1819
Stoddard, E. M., 1305
Stoller, B. B., 1496
Stone, L. E. W., 1521
Storey, W. B., 1863h
Stoughton, R. H., 1085d
Stout, P. R., 1085e
Stover, R. H., 1961i
Straube, E., 1897
Strecker, B., 1284
Strong, R. G., 1530
Suárez de Castro, F., 1893
Sumitomo, M., 1729
Summers, F. M., 1360
Sundararaj, D. D., 1870
Sunjic, K., 1645
Suriname Departement van Landbouw, 2008q
Suzuki, H., 1493
Suzuki, Y., 1478
Swaminathan, M. S., 1694
Swezey, A. W., 1413i
Swift, L. J., 1851
Swinzow, H., 1153, 1850
Szczypiorska, J., 1416

Tabayoyong, F. T., 1929, 1930, 1931
Tabin, S., 1441

Tabisz, J., 1676
Taboada, V. L. E., 1829
Tager, J. M., 1876
Takahashi, K., 1199, 1806
Takeo, T., 1960f
Takeshita, S., 1149, 1811
Tanada, T., 1085f
Tanganyika Agricultural Corporation, 2008r
Tani, T., 1295, 1355
Tapio, E., 1708
Taris, B., 1771
Tasmanian Department of Agriculture, Plant Pathology Division, 1371q
Taylor, C. F., 1371t
Taylor, O. C., 1793, 1863i
Taylor, R. H., 1307
Teixeira, E. F., 1900
Teixeira Mendes, J. E., 1961j
Terman, G. L., 1463
Terpstra, W., 1032
Tešić, T., 1341
Teubner, F. G., 1551
Teuscher, H., 1762
Tewfik, M., 1245
Thate, R., 1274
Thiele, I., 1094
Thimann, K. V., 1402, 1622
Thirion, F., 1919
Thomas, F. B., 1163
Thomas, J. D., 1459
Thomason, I. J., 1576
Thompson, J. P., 1468
Thompson, L. M., 1977
Thomson, R., 1616, 1618
Thorn, W. A., 1788
Thorne, G. N., 1085g
Thresh, J. M., 1635
Thrower, L. B., 1880
Thung, T. H., 1655s
Tinsley, I. J., 1197
Tisnes, P. J., 1651
Todd, M., 1085i
Toenjes, W., 1150
du Toit, J. L., 1933
Tokarskaja (Merenova), V. I., 1019
Tolhurst, J. A. H., 1944
Toll Jubés, J. G., 1187q
Tolnay, P., 1655t
Tomaselli, E., 1007
Tomlinson, J. A., 1533
(Toole, E. H.), 1495
(Toole, V. K.), 1495
Toothill, J., 1044
Topalović, G., 1371u
Topper, B. F., 1879
Tosello, R. N., 1961k
Toth, S. J., 1061
Toul, V., 1526
Travert, J., 1842
Treshow, M., 1371v
Trickett, E. S., 1075
Trippett, S., 1698
Trupin, F., 1391
Tsalpatouros, A., 1875
Tsukamoto, Y., 1734
Tuboi, Y., 1585q
Turel, F. L. M., 1050
Turica, A., 1270, 1336, 1862x
Turner, J. S., 1085i
Tymko, M. M., 1239
Tysdal, H. M., 1690
Tysser, H. F., 2001

Ueda, K., 1950
Ueki, K., 1477
Ueno, K., 1737
U Huan-Juan', 1586h
Ulrich, R., 1181
Umhauer, M., 1111
U.S. Department of Agriculture, 1107, 2008s
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Valdeyron, G., 1127
Vallejo y Vallejo, E., 1672
Vance, A. M., 1783f
Van Middelem, C. H., 1585v, 1641
Van Roechoudt, L. L., 1187r
Vargas S., R., 1491
Varma, T. N. S., 1823
Vary, K. A., 1067
Vaughan, E. K., 1273
Vávra, M., 1140
Vega, J., 1328
Veldhuis, M. K., 1851
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Venkataratanam, L., 1952
Venketram, T. M., 1956
Vereščagin, B. V., 1335
Vergani, A. R., 1839, 1841, 1863j
Vergnano, O., 1428, 1763
Verguin, J., 1701r
Verma, B. S., 1513
Verzele, M., 1684
Vickery, L. S., 1608
Vickery, R. K., Jr., 1783g
Vidal Martín, D., 1501
Viégas, A. P., 1894
Vieitez, E., 1233
Vigorov, L. I., 1065
de Vilmorin, R., 1539
Violante, C., 1240u
Virgin, H. I., 1085j
Vitolović, V., 1115
Vivoli, T., 1240v
Vlček, F., 1526
Vogel, G., 1085k
Vogel, R., 1232, 1863k
Vogel, W., 1325, 1326
Volodarskij, N. I., 1614
Voronova, A. E., 1420
van de Vrie, M., 1371w

Wade, G. C., 1292, 1296, 1297, 1298
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Wagnon, H. K., 1269
Wain, R. L., 1044
Waldo, G. F., 1198
Walker, J. C., 1585s
Walker, L. C., 1020
Walkof, C., 1414
Wallace, J. M., 1271, 1794
Wallace, R. H., 1160
Walls, I. G., 1085l
Wander, I. W., 1813
Wang, C.-C., 1934
Wang, C. H., 1177
Wanscher, J. H., 1006
Ward, H. S., Jr., 1121
Ward, J. R., 1292
Ward, W. E., 1085m
Warington, K., 1085n
Waris, H., 1484
Warnock, R. E., 1064
Warren, G. F., 1398
Warren, J. C. R., 1413j
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Watanabe, T., 1152, 1861
Watson, D. P., 1702
Watson, J., 1616, 1680
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Waxman, S., 1758
Webb, A. J., 1571, 1722
Webber, R., 1082
Weir, F. J., 1414
Weiss, J., 1221
Welch, J. E., 1529
Welkerling, E. M. L., 1187s, 1187t, 1240w
Wellensiek, S. J., 1978
Wellington, R., 1209
Wells, D. A., 1075
Wensley, R. N., 1300
Wertheimer, M., 1852, 1853
West of Scotland Agricultural College, 2008t
Westgate, P. J., 1456
Weston, R. G., 1669
Weydahl, E., 1586i
Wezelenburg, P. A., 1103
Wezenberg, H. J., 1703
Whaley, R. B., 1068
Whellan, J. A., 1324
Whitaker, T. W., 1585g, 1586j
White, D. G., 1349, 1350
White, E. S., 1371c
White, R. G., 1380
Widmoyer, F. B., 1702
Wightman, F., 1044
Wilcox, H. J., 1543
Wilcox, J., 1582
Wildbolz, T., 1325, 1326, 1334, 1365
Wilhelminadorp, Proefstation Fruitteelt Volle Grond, 1188
Williams, A. J., 1160
Williams, A. H., 1452
Williams, H. E., 1266, 1267, 1371x
Wilson, E. E., 1250, 1291
Wilson, E. M., 1433
Wilson, G., 1939
Wilson, G. J., 1294
Wilson, J. D., 1519
Wilson, J. W., 1585v
(Wilson, W. F., Jr.), 1240b
Winfree, J. P., 1562
Wing, R. E., 1862h
Wingard, R. G., 1350
Winocour, E., 1827
Winstead, N. N., 1735
Wisconsin Agricultural Experiment Station, 2008u
Wittwer, S. H., 1047, 1551
Włodek, J., 1147, 1253
Włodek, L., 1147
Wolcott, G. N., 1867
Wolf, C. N., 1357
Wolf, F. T., 1085o
Wood, F. C., 1586k
Wood, G. W., 1371y
Wood, J. P., 2008b

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Woods, J. J., 1089
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Woyke, H., 1416, 1470
Wyckoff, C. G., 1742

Yagi, T., 1806, 1822
Yagyu, P. K., 1545
Yen, D. E., 1449
Yerkes, W. D., Jr., 1490, 1730
Yokomizo, T., 1199
Young, P. A., 1586l
Young, R. A., 1279
Yuan, T., 1559
Yukawa, I., 1806

Zabala, S., 1834
Zahanova, E. I., 1216
Zalewski, W., 1187u, 1190
Zaliwski, S., 1105
Zamecnik, P. C., 1622
Zangheri, S., 1345
Zeck, E. H., 1785, 1840
Zentmyer, G. A., 1788, 1795
Zetsche, K., 1038
Zeylstra, H. H., 1371z
Zimmerman, L. J., 1540
Zink, F. W., 1528, 1529
Zollar, C. O., 1202
Zub, L., 1678
Zuluaga, P. A., 1207
Zwar, J. A., 1037
Zwicky, P., 1367